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Automotive Technicians Environmental Action Movement

A Curriculum Guide for Environmentally Responsible Automotive Servicing

GOVERNMENT DOCUMENTS
COLLECTION

MAY 11 1995

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FOREWORD

On March 25, 1994, Massachusetts Bay Community College (MBCC) received a grant from the Massachusetts Department of Environmental Protection to develop a curriculum that addresses environmental health and safety issues for automotive technicians. Planned in 26 self-contained modules, the project would supplement existing secondary and post-secondary vocational curriculum, and could be integrated into other academic areas. The curriculum would be designed to accommodate further expansions and enhancements by individual instructors.

The Project Team held its first meeting at the Automotive Technical Advisory Meeting of April 29, 1994, during which a time table was developed. A subsequent planning meeting occurred on May 25, 1994, during Automotive Tech Day. At these two meetings, the Team established September 30, 1994 as the date of completion for the project...a short four months for the Team to do a great deal of research and compilation.

This restrictive schedule could not have been met if it were not for the tenacity and perseverance with which Thomas Iglesias of Keefe Vocational Technical High School approached the curriculum development. The assistance from Steve Sullivan of MBCC was also critical to the project's completion.

The completed project was unveiled on October 27, 1994, at the "Train the Trainer" Workshop at MBCC. The presentation was attended by automotive instructors from various areas of Massachusetts, industry specialists, and representatives from the United States Environmental Protection Agency Region I (EPA) and the Massachusetts Department of Environmental Protection (DEP).

I would like to thank Nancy Wrenn, Compliance Assistance Coordinator at the Massachusetts DEP and George Franz, Senior Project Manager at the Massachusetts Executive Office of Environmental Affairs for their expert advice and untiring support throughout the project. Working under the auspices of the Massachusetts Department of Education, John McDonagh of the Massachusetts Vocational Curriculum Resource Center was invaluable in setting directions for the project. Thanks also to Pammy Eddinger, Director for Publications and Public Information at MBCC, who coordinated the production of the curriculum guide.

I hope that this project, a result of much hard work and dedication, will be the start of a strong and lasting partnership among the federal and state environmental agencies, and the educational community. Massachusetts Bay Community College is proud to be an educational partner in this environmental movement to ensure the health of our community, and our future.

Howard W. Ferris

Director of Automotive Programs, MBCC

October 27, 1994

INTRODUCTION

The 1990's have brought a significant focus on the condition of the air we breathe, the water we drink, and the land we eat from. Pollution is a real and formidable enemy of our modern society. Many large cities across the country at different times of the year have air that is unhealthy to breathe. The threat of water contamination is ever-present, soil contamination is confirmed in many areas.

The Green Movement is alive! Recycling programs of paper, glass, and plastic are here. Consumers are demanding accountability of their environment from their Local, State and Federal Governments as well as from the companies they choose to do business with.

The next century will bring major advances in technology that will reduce the amount of air pollution through the use of electrically powered automobiles and alternatively fueled trucks.

Our challenge today is to be environmentally responsible. By joining the A.T.E.A.M., Automotive Technicians Environmental Action Movement, you can do your part in preserving the lifeblood of clean air, water and soil for your children's children!

A.T.E.A.M. EFFORT CAN MAKE A WORLD OF DIFFERENCE!

SECTION B COURSE OBJECTIVES & TEACHING METHODS

COURSE OBJECTIVES

The Objective of this course is to inform secondary level students of health and safety issues related to servicing today's vehicles, the regulations which affect the Automotive Service Industry, opportunities for preventing pollution and best management practices.

TEACHING METHODS

This course has been designed to reach as many students as possible through the use of a broad range of teaching tools.

These tools include:

1. Pre-Test and Post Test
2. Loose Leaf Handouts
3. Team Learning Activities
4. Role Play Scenarios
5. Work Assignments
6. Field Trip Options
7. Introductory Video (overview of entire curriculum)
8. Resource Appendix

INTEGRATION OPPORTUNITIES

This curriculum has been designed to be taught in either an academic or vocational classroom. Each section can be taught independently of the other and can be used to complement the on-going curriculum. However, Sections 3 and 4 are basic to understanding each of the other sections.

Of the sixteen topics covered:

- 6 are basic to a variety of work situations [Sections C, D, L, M, Q, R]
- 8 deal with specific automotive products [Sections E, F, G, H, I, J, K, O]
- 2 focus on issues related to automotive emissions [Sections N & P]

SECTION B COURSE OBJECTIVES & TEACHING METHODS

Studies have shown that all students learn in a variety of ways.

It's easy to forget the four questions each type of student asks during an educational experience:

Why?

What?

How?

If?

Studies have shown that students learn by:

Listening

Watching

Feeling

Doing

Remember the three principles of learning:

1. "Tell me and I will forget".
2. "Show me and I will understand"
3. "Involve me and I will remember"

SECTION B COURSE OBJECTIVES & TEACHING METHODS

The outline of each section is as follows:

1. Sectional and Enabling Objective

Studies have shown that if the students are given a clear picture of the educational objective they are more driven to succeed.

2. Pre-Test

The pre-test is an instructional tool used to identify the current knowledge level of each student. This tool can also be helpful in determining the team members for the learning activities.

3. Information Sheets

The information sheets contain the technical aspects of each section. They give the student the supporting information needed to achieve the sectional objective.

They also serve as a resource to be used for integrated learning projects as well as for future reference. It is suggested the students keep these in a three ring binder.

4. Learning Activities

The learning activities are used to stimulate the students critical thinking and get them involved in the educational process. They should be fun and diverse. Instructors are encouraged to create their own learning activities that best suit the needs of their students.

5. Post-Test

The post-test is used to validate the learning process. A minimum test score of 80% is required to successfully complete each section. An example of a certificate of completion is located in the Appendix and may be used at the instructor's discretion.

SECTION C

WHAT IS A HAZARDOUS WASTE?

COURSE OBJECTIVE

The objective of this course is to inform secondary level students of health and safety issues related to servicing today's vehicles, the regulations which affect the Automotive Service Industry, opportunities for preventing pollution and best management practices.

SECTIONAL OBJECTIVE

Given an information sheet and learning activities, you will be able to identify what a hazardous waste is. Your performance will be evaluated by the number of correct answers you achieve on the post test. A minimum score of 80% is required to successfully complete this section.

ENABLING OBJECTIVE

1. Explain the difference between a material, a solid waste and a hazardous waste.
2. Identify the different characteristics that determine if a waste is hazardous.
3. List the different modes of entry a hazardous substance can take to get into the body.

SECTION C

WHAT IS A HAZARDOUS WASTE?

PRE-TEST

Choose the one correct answer:

1. The characteristics listed below are hazardous, except for?

A) Ignitable	B) Reactive
C) Toxic	D) Biodegradable

2. Hazardous substances can enter the body through any one of these methods, except for?

A) Inhalation	B) Skin Absorption
C) Perspiration	D) Ingestion

3. A reactive waste is:

A) Ignitive	B) Explosive when mixed
C) Corrosive	D) Toxic

4. Ingestion is a mode of entry of a hazardous substance through:

A) The lungs	B) The skin
C) The mouth	D) The ears

5. Inhalation is a mode of entry of a hazardous substance through:

A) The ears	B) The mouth
C) The lungs	D) The eyes

INFORMATION SHEET



C-1

SECTION C

WHAT IS A HAZARDOUS WASTE?

A waste is any solid, liquid or contained gaseous material that you no longer use and either dispose of or recycle. Wastes that could cause injury or death or damage or pollute the land, air or water are considered hazardous wastes.

There are two ways a waste may be identified as hazardous: it may be listed in the regulations as such or it may be defined by its hazardous characteristic as listed below.

1. Ignitable: easily catches fire, flash point below 140 degrees, common examples are gasoline, kerosene, parts cleaning solvents, and paint thinners.
2. Corrosive: easily corrodes materials or human tissue, common examples are battery acid, paint strippers, and some floor cleaners.
3. Reactive: violent, potentially explosive reaction, produces toxic gases when mixed with water, air or other materials. This type of waste is not commonly encountered in automotive servicing.
4. Toxic: can leach toxic chemicals as determined by a special laboratory test. Common examples are used engine oil, sludge from shop floor drains and paint wastes.

In order for a hazardous substance to exert its toxic effect, it must come in contact with a body cell. There are three modes of entry for chemical compounds in the form of liquids, gases, mists, dusts, fumes, and vapors:

1. Ingestion (through the mouth)
2. Skin absorption (through the skin)
3. Inhalation (through the lungs)

SECTION C

WHAT IS A HAZARDOUS WASTE?

LEARNING ACTIVITY

A. LET'S BUILD A VEHICLE

1. Assemble the students into teams of no more than four.
2. Ask the students to name their team the name of a car.
3. Write the team names on the board in separate columns.
4. Ask each team to start to identify the different materials that make up each part of the car.
5. Document on the board each item the students come up with.
6. Every time a team comes up with a material they get 1 point.
7. When the students run out of materials tally the points.
8. Highest scoring team wins!

Concept: Fluids and chemicals used in servicing vehicles are hazardous, not the materials in the automobile. Therefore, the service technician and service operation are vulnerable, not the car owner.

Example:

Mustangs		Vipers		Cobras	
Glass	1	Cloth	1	Metal	1
Plastic	1	Rubber	1	Vinyl	1
Aluminum	1	Iron	1	Styrofoam	1
Chrome	1				
4 points		3 points		3 points	

WINNER !!!!!

SECTION C

WHAT IS A HAZARDOUS WASTE?

LEARNING ACTIVITY

B. TO HAZ OR NOT TO HAZ, THIS IS THE QUESTION?

1. Assemble the students into teams of no more than four.
2. Ask the students to name their team the name of a car.
3. Write the team names on the board in separate columns.
4. Ask each team to start to identify the different fluids and gases that are used in a vehicle.
5. List on the board each item the students come up with.
6. Every time a team comes up with a fluid or gas they get 1 point.
7. When the students run out of items tally the points.
8. Highest scoring team wins!
9. Ask "How do these fluids or gases become wastes?"
10. Ask "How do these fluids or gases enter the body?"
11. Ask "Are these fluids or gases hazardous wastes?"

Cougars		Supras		Chargers	
Gasoline	1	A/T Oil	1	Brake Fluid	1
Battery Acid	1	M/T Oil	1	Antifreeze	1
Refrigerant	1	Washer Fluid	1	Clutch Fluid	1
Engine Oil	1			P/S Fluid	1
				Rear Axle Oil	1
4 Points		3 points		5 Points	

WINNER !!!

SECTION C

WHAT IS A HAZARDOUS WASTE?

LEARNING ACTIVITY

C. WORK ASSIGNMENT

1. Read and study the information sheet.
2. Write down any questions you may have about it.
3. With the use of dictionary, define the word "Recycle".
4. Give three examples of items that are "Recycled".
5. List three examples of automotive wastes that are hazardous and why?

SECTION C**WHAT IS A HAZARDOUS WASTE?****LEARNING
ACTIVITY****D. VISIT TO A LOCAL AUTOMOTIVE RECYCLING
OPERATION**

1. Ask the students to attend a field trip to the "Auto Salvage Yard"
2. Document the process the salvager goes through in separating the materials that the vehicle is made of.
3. Determine how the materials will then be used.
4. Document the process the salvager goes through in separating the fluids and gases from the vehicle.
5. Determine what then happens to the fluids and gases.

SECTION C

WHAT IS A HAZARDOUS WASTE?

POST-TEST

Choose the one correct answer:

1. The characteristics listed below are hazardous, except for?

A) Ignitable	B) Reactive
C) Toxic	D) Biodegradable

2. Hazardous substances can enter the body through any one of these methods, except for?

A) Inhalation	B) Skin Absorption
C) Perspiration	D) Ingestion

3. A reactive waste is:

A) Ignitable	B) Explosive when mixed
C) Corrosive	D) Toxic

4. Ingestion is a mode of entry of a hazardous substance through:

A) The lungs	B) The skin
C) The mouth	D) The ears

5. Inhalation is a mode of entry of a hazardous substance through:

A) The ears	B) The mouth
C) The lungs	D) The eyes

SECTION C**WHAT IS A HAZARDOUS WASTE?****PRE- AND
POST- TEST
ANSWER KEY**

1. D
2. C
3. B
4. C
5. C

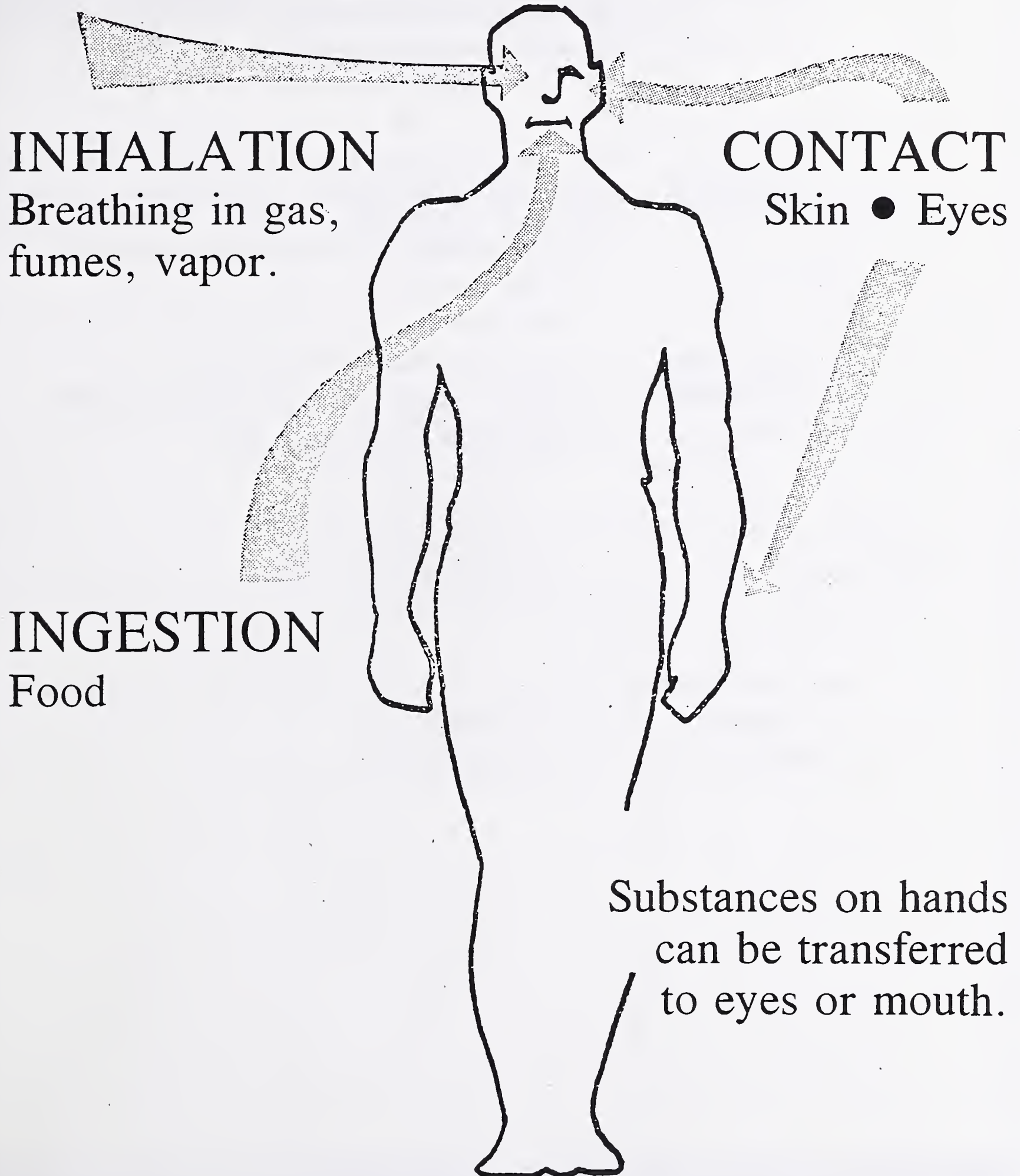
**INFORMATION
RESOURCES**

Department of Environmental Protection Compliance
Assistance Line (617-292-5898)

Obtain the Small Quantity Generator of Hazardous Waste
Workbook by calling State Bookstores at 617-727-2834 or
413-784-1378.

Borrow video " Little Things Mean a Lot" 14 Mins.
617-292-5898

Ways that Hazardous Substances Enter the Body



SECTION D**HAZARD COMMUNICATION STANDARD****COURSE
OBJECTIVE**

The Objective of this course is to inform secondary level students of health and safety issues related to servicing today's vehicles, the regulations which affect the Automotive Service Industry, opportunities for preventing pollution and best management practices.

**SECTIONAL
OBJECTIVE**

Given an information sheet and learning activities you will learn about the Hazard Communication Standard. Your performance will be evaluated by the number of correct answers you achieve on the post test. A minimum score of 80% is required to successfully complete this section.

**ENABLING
OBJECTIVE**

1. Identify what a Material Safety Data Sheet is.
2. Determine what type of information is found on an MSDS.
3. Explain where you can obtain an MSDS.

SECTION D**HAZARD COMMUNICATION STANDARD****PRE-TEST
QUESTIONS**

Choose the one correct answer:

1. The Hazard Communication Standard is:

- A) A book
- B) A law
- C) A guideline
- D) Optional

2. MSDS's are:

- A) Shipping Info
- B) Hazardous Materials
- C) Technical Data Sheets
- D) General Info Sheets

3. Suppliers are required to send a MSDS sheet with the:

- A) Fifth Shipment
- B) Last Shipment
- C) Tenth Shipment
- D) First Shipment

4. The MSDS contains the information shown below, except for:

- A) Explosion Hazards
- B) Protection Methods
- C) Physical & Chemical Properties
- D) Shipping Cost

5. The MSDS's for the chemicals you work with are stored:

- A) at the State Capitol
- B) in Washington D.C.
- C) in the Employer files
- D) at the Post Office

SECTION D**HAZARD COMMUNICATION STANDARD****INFORMATION
SHEET****D-1**

The Hazard Communication Standard (HCS), frequently called the "Employee Right to Know", is a law administered by the Occupational Safety and Health Administration (OSHA) and equivalent state labor agencies.

Under the HCS, manufacturers and importers of hazardous substances must evaluate the hazards of the chemicals they supply to customers. They must complete detailed technical bulletins called Material Safety Data Sheets (MSDS) and properly label their containers. The MSDS must be made available to the end user.

Suppliers are required to send an MSDS along with the first shipment of a hazardous substance to a company and supply any updates when any significant changes are made to the MSDS.

The MSDS document contains information regarding hazardous ingredients, physical and chemical characteristics, fire and explosion hazards, health hazards, safe-handling, use and disposal, control and protection methods.

Employers and Operators of Automotive Servicing facilities must:

1. Prepare an inventory of all chemicals and hazardous substances used at the facility which require an MSDS.
2. Develop a written hazard communication program which describes how the HCS will be implemented at the facility.
3. Conduct training of all employees so they will know what materials are hazardous, how to find information on those materials and how to protect themselves (based on 11 or more employees).
4. Provide access of MSDSs to every employee.
5. Provide chemical handling and emergency response training to employees.
6. Ensure all containers are properly labeled.

SECTION D**HAZARD COMMUNICATION STANDARD****LEARNING
ACTIVITY****A. JUST THE FACTS, SIR, JUST THE FACTS**

1. Assemble the students in groups of no more than four.
2. Ask the students to name their teams the name of an Auto Maker.
3. Write the team names on the board in separate columns.
4. Use the MSDS overhead transparency to familiarize the students with the different sections.
5. Pass out an MSDS on engine oil and give them 15 minutes to study it.
6. Starting with the first team ask them a question from the MSDS and give them 20 seconds to respond.
7. Once they respond ask the other teams if they agree with the answer.
8. Assign 1 point to the teams who got it right. Subtract 1 point from the teams who got it wrong.
9. Teams can pass on questions two times before incurring a 1 point penalty per question unanswered.
10. Be sure each team has a chance to answer at least five questions.
11. End the game and tally up the points.
12. The Team with the most points wins!

EXAMPLE:

Question #	Team GM	Team Toyota	Team Chrysler
1.	+1	+1	1
2	-1	+1	+1
3.	0	+1	1
4.	-1	-1	+1
5.	+1	+1	+1
Total	1	3	1

Winner !

SECTION D

HAZARD COMMUNICATION STANDARD

LEARNING ACTIVITIES

B. WORK ASSIGNMENT

Using the engine oil MSDS, answer the following questions:

1. What is the product technical information phone number?
2. Who is the supplier?
3. What are the potentially hazardous ingredients?
4. What are the effects of over exposure?
5. What is the first aid remedy for skin contact?
6. What are the unusual fire and explosion hazards?
7. What are the procedures to be used if this material is released or spilled?
8. What special respiratory protection is required?
9. Who prepared this MSDS sheet?
10. Where can they be reached for further information?

SECTION D

HAZARD COMMUNICATION STANDARD

LEARNING ACTIVITIES

C. REVIEW WORK ASSIGNMENT

This is a chance to let your students strut their stuff!

Ask for volunteers to answer the homework questions. Use the homework assignment as a prelude to the post test.

Answers to the homework assignment:

1. 800-662-4525
2. Mobil Oil Corporation.
3. None.
4. Slight skin irritation, Slight eye irritation.
5. Wash contact areas with soap and water.
6. None
7. Absorb with fire retardant treated saw dust, diatomaceous earth, or equivalent. Shovel up and dispose of at appropriate waste disposal facility in accordance with current applicable laws and regulations and product characteristics.
8. No special requirements under ordinary conditions with adequate ventilation.
9. Mobil Oil Corporation
10. Mobil Oil Corporation

Product Formulation and Quality Control
3225 Gallows Road
Fairfax, VA. 22037 (703-849-3265)

SECTION D**HAZARD COMMUNICATION STANDARD****PRE- AND
POST- TEST
ANSWER KEY**

1. B
2. C
3. D
4. D
5. C

**INFORMATION
RESOURCES**

Occupational Safety & Health Administration (Federal) 617-565-7164
OSHA Consultation Service (State) 617-727-3982 or 617-727-3463
Chemical Referral Center 800-262-8200

SECTION D**HAZARD COMMUNICATION STANDARD****POST TEST**

Choose the one correct answer:

1. The Hazard Communication Standard is:
A) A book B) A law
C) A guideline D) Optional
2. MSDS's are:
A) Shipping Info B) Hazardous Materials
C) Technical Data Sheets D) General Info Sheets
3. Suppliers are required to send a MSDS sheet with the:
A) Fifth Shipment B) Last Shipment
C) Tenth Shipment D) First Shipment
4. The MSDS contains the information shown below, except for:
A) Explosion Hazards B) Protection Methods
C) Physical & Chemical Properties D) Shipping Cost
5. The MSDS's for the chemicals you work with are stored:
A) at the State Capitol B) in Washington D.C.
C) in the Employer files D) at the Post Office

MATERIAL SAFETY DATA SHEET

PAGE 1 OF 1

TOYOTA MOTOR OIL 10W-30 SG

REVISED: 12/08/89

I. PRODUCT IDENTIFICATION
INFILREX 1030 10W-30 SG

SUPPLIER:

MOBIL OIL CORP.

CHEMICAL NAMES AND SYNONYMS:

PET. HYDROCARBONS AND ADDITIVES

USE OR DESCRIPTION:

AUTOMOTIVE ENGINE OIL

HEALTH EMERGENCY TELEPHONE:

(609) 737-4411

TRANSPORT EMERGENCY TELEPHONE:

(800) 424-9300 CHEMTREC

PRODUCT TECHNICAL INFORMATION:

(800) 662-4525

II. TYPICAL CHEMICAL AND PHYSICAL PROPERTIES

APPEARANCE: ASTM 3.0 LIQUID

ODOR: MILD

PH: NA

VISCOSITY AT 100 F. SUS: 322.6 AT 40 C. CS: 63.4

VISCOSITY AT 210 F. SUS: 62.6 AT 100 C. CS: 10.7

FLASH POINT F(C): > 390(199) (ASTM D-92)

MELTING POINT F(C): NA

POUR POINT F(C): -25(-32)

BOILING POINT F(C): > 600(316)

RELATIVE DENSITY, 15/4 C: 0.878

SOLUBILITY IN WATER: NEGLIGIBLE

VAPOR PRESSURE-MM HG 20C: < .1

NA=NOT APPLICABLE NE=NOT ESTABLISHED D=DECOMPOSES

FOR FURTHER INFORMATION, CONTACT YOUR LOCAL MARKETING OFFICE.

III. INGREDIENTS

WT PCT (APPROX)	EXPOSURE LIMITS MG/M3	SOURCES PPM (AND NOTES)
--------------------	--------------------------	----------------------------

POTENTIALLY HAZARDOUS INGREDIENTS:

NONE

OTHER INGREDIENTS:

REFINED MINERAL OILS >85

ADDITIVES AND/OR OTHER INGREDIENTS <15

SEE SECTION XII FOR COMPONENT REGULATORY INFORMATION.

SOURCES: A=ACGIH-TLV, A*=SUGGESTED-TLV, M=MOBIL, O=OSHA, S=SUPPLIER

NOTE: LIMITS SHOWN FOR GUIDANCE ONLY. FOLLOW APPLICABLE REGULATIONS.

IV. HEALTH HAZARD DATA

--- INCLUDES AGGRAVATED MEDICAL CONDITIONS, IF ESTABLISHED ---

THRESHOLD LIMIT VALUE: 5.00 MG/M3 SUGGESTED FOR OIL MIST

EFFECTS OF OVEREXPOSURE: SLIGHT SKIN IRRITATION. SLIGHT EYE IRRITATION.

V. EMERGENCY AND FIRST AID PROCEDURES

--- FOR PRIMARY ROUTES OF ENTRY ---

EYE CONTACT: FLUSH WITH WATER.

SKIN CONTACT: WASH CONTACT AREAS WITH SOAP AND WATER.

INHALATION: NOT EXPECTED TO BE A PROBLEM.

INGESTION: NOT EXPECTED TO BE A PROBLEM. HOWEVER, IF GREATER THAN 1/2 LITER(PINT) INGESTED, IMMEDIATELY GIVE 1 TO 2 GLASSES OF WATER AND CALL A PHYSICIAN, HOSPITAL EMERGENCY ROOM OR POISON CONTROL CENTER FOR ASSISTANCE. DO NOT INDUCE VOMITING OR GIVE ANYTHING BY MOUTH TO AN UNCONSCIOUS PERSON.

***** VI. FIRE AND EXPLOSION HAZARD DATA *****

FLASH POINT F(C): > 390(199) (ASTM D-92)

FLAMMABLE LIMITS: LEL: .6 UEL: 7.0

EXTINGUISHING MEDIA: CARBON DIOXIDE, FOAM, DRY CHEMICAL AND WATER FCG.

SPECIAL FIRE FIGHTING PROCEDURES: FOR FIRES IN ENCLOSED AREAS.

FIREFIGHTERS MUST USE SELF-CONTAINED BREATHING APPARATUS. PREVENT RUNOFF FROM FIRE CONTROL OR DILUTION FROM ENTERING STREAMS OR DRINKING WATER SUPPLY. WATER OR FOAM MAY CAUSE FROTHING. USE WATER TO KEEP FIRE EXPOSED CONTAINERS COOL. WATER SPRAY MAY BE USED TO FLUSH SPILLS AWAY FROM EXPOSURE.

UNUSUAL FIRE AND EXPLOSION HAZARDS: NONE

NFPA HAZARD ID: HEALTH: 0. FLAMMABILITY: 1. REACTIVITY: 0

***** VII. REACTIVITY DATA *****

STABILITY (THERMAL, LIGHT, ETC.): STABLE

CONDITIONS TO AVOID: EXTREME HEAT

INCOMPATIBILITY (MATERIALS TO AVOID): STRONG OXIDIZERS

HAZARDOUS DECOMPOSITION PRODUCTS: CARBON MONOXIDE.

HAZARDOUS POLYMERIZATION: WILL NOT OCCUR

***** VIII. SPILL OR LEAK PROCEDURE *****

ENVIRONMENTAL IMPACT: REPORT SPILLS AS REQUIRED TO APPROPRIATE AUTHORITIES. U. S. COAST GUARD REGULATIONS REQUIRE IMMEDIATE REPORTING OF SPILLS THAT COULD REACH ANY WATERWAY INCLUDING INTERMITTENT DRY CREEKS. REPORT SPILL TO COAST GUARD TOLL FREE NUMBER 800-424-8802.

PROCEDURES IF MATERIAL IS RELEASED OR SPILLED: ADSORB ON FIRE RETARDANT TREATED SAWDUST, DIATOMACEOUS EARTH, ETC. SHOVEL UP AND DISPOSE OF AT AN APPROPRIATE WASTE DISPOSAL FACILITY IN ACCORDANCE WITH CURRENT APPLICABLE LAWS AND REGULATIONS, AND PRODUCT CHARACTERISTICS AT TIME OF DISPOSAL.

WASTE MANAGEMENT: PRODUCT IS SUITABLE FOR BURNING IN AN ENCLOSED, CONTROLLED BURNER FOR FUEL VALUE OR DISPOSAL BY SUPERVISED INCINERATION. SUCH BURNING MAY BE LIMITED PURSUANT TO THE RESOURCE CONSERVATION AND RECOVERY ACT. IN ADDITION, THE PRODUCT IS SUITABLE FOR PROCESSING BY AN APPROVED RECYCLING FACILITY OR CAN BE DISPOSED OF AT ANY GOVERNMENT APPROVED WASTE DISPOSAL FACILITY. USE OF THESE METHODS IS SUBJECT TO USER COMPLIANCE WITH APPLICABLE LAWS AND REGULATIONS AND CONSIDERATION OF PRODUCT CHARACTERISTICS AT TIME OF DISPOSAL.

***** IX. SPECIAL PROTECTION INFORMATION *****

EYE PROTECTION: NORMAL INDUSTRIAL EYE PROTECTION PRACTICES SHOULD BE EMPLOYED.

SKIN PROTECTION: NO SPECIAL EQUIPMENT REQUIRED. HOWEVER, GOOD PERSONAL HYGIENE PRACTICES SHOULD ALWAYS BE FOLLOWED.

RESPIRATORY PROTECTION: NO SPECIAL REQUIREMENTS UNDER ORDINARY CONDITIONS OF USE AND WITH ADEQUATE VENTILATION.

VENTILATION: NO SPECIAL REQUIREMENTS UNDER ORDINARY CONDITIONS OF USE AND WITH ADEQUATE VENTILATION.

***** X. SPECIAL PRECAUTIONS *****

NO SPECIAL PRECAUTIONS REQUIRED.

XI. TOXICOLOGICAL DATA

---ACUTE TOXICOLOGY---

ORAL TOXICITY (RATS): LD50: > 5 G/KG SLIGHTLY TOXIC ESTIMATED; ---
BASED ON TESTING OF SIMILAR PRODUCTS AND/OR THE COMPONENTS.

DERMAL TOXICITY (RABBITS): LD50: > 2 G/KG SLIGHTLY TOXIC ESTIMATED; ---
BASED ON TESTING OF SIMILAR PRODUCTS AND/OR THE COMPONENTS.

INHALATION TOXICITY (RATS): NOT APPLICABLE ---HARMFUL CONCENTRATIONS OF
MISTS AND/OR VAPORS ARE UNLIKELY TO BE ENCOUNTERED THROUGH ANY
CUSTOMARY OR REASONABLY FORESEEABLE HANDLING, USE, OR MISUSE OF
THIS PRODUCT.

EYE IRRITATION (RABBITS): MAY CAUSE SLIGHT IRRITATION. ---BASED ON
TESTING OF SIMILAR PRODUCTS AND/OR THE COMPONENTS.

SKIN IRRITATION (RABBITS): MAY CAUSE SLIGHT IRRITATION ON PROLONGED OR
REPEATED CONTACT. ---BASED ON TESTING OF SIMILAR PRODUCTS AND/OR
THE COMPONENTS.

---SUBCHRONIC TOXICOLOGY (SUMMARY)---

SEVERELY SOLVENT REFINED AND SEVERELY HYDROTREATED MINERAL BASE OILS
HAVE BEEN TESTED AT MOBIL ENVIRONMENTAL AND HEALTH SCIENCES
LABORATORY BY DERMAL APPLICATION TO RATS 5 DAYS/WEEK FOR 90 DAYS AT
DOSES SIGNIFICANTLY HIGHER THAN THOSE EXPECTED DURING NORMAL
INDUSTRIAL EXPOSURE. EXTENSIVE EVALUATIONS INCLUDING MICROSCOPIC
EXAMINATION OF INTERNAL ORGANS AND CLINICAL CHEMISTRY OF BODY
FLUIDS, SHOWED NO ADVERSE EFFECTS.

---CHRONIC TOXICOLOGY (SUMMARY)---

THE BASE OILS IN THIS PRODUCT ARE SEVERELY SOLVENT REFINED AND/OR
SEVERELY HYDROTREATED. TWO YEAR MOUSE SKIN PAINTING STUDIES OF
SIMILAR OILS SHOWED NO EVIDENCE OF CARCINOGENIC EFFECTS.

---OTHER TOXICOLOGY DATA---

STUDIES HAVE SHOWN THAT MICE DEVELOPED SKIN CANCER AFTER REPEATED
APPLICATION OF USED GASOLINE ENGINE OIL TO THE SKIN FOR THE LIFETIME
OF THE ANIMALS. NO EFFORT WAS MADE TO WASH THE OIL OFF BETWEEN
APPLICATIONS. USED OIL FROM DIESEL ENGINES DID NOT PRODUCE THIS
EFFECT. BECAUSE OF THE EFFECTS OBSERVED IN THE LABORATORY TESTS,
SERVICE STATION WORKERS, ENGINE MECHANICS, AND ALL PERSONS WHO
REGULARLY HANDLE USED MOTOR OIL SHOULD TAKE PRECAUTIONS TO MINIMIZE
CONTACT WITH THE OIL. GOOD PERSONAL HYGEINE PRACTICES, INCLUDING
WASHING ANY SKIN CONTACT AREAS AND REMOVING OIL SOAKED CLOTHING,
SHOULD BE FOLLOWED.

XXXXXXXXXXXXXXXXXXXXX XII. REGULATORY INFORMATION XXXXXXXXXXXXXXXXXXXXXXXX
GOVERNMENTAL INVENTORY STATUS: ALL COMPONENTS REGISTERED IN ACCORDANCE WITH TSCA.

D.I.T. SHIPPING NAME: NOT APPLICABLE

D.I.T. HAZARD CLASS: NOT APPLICABLE

US OSHA HAZARD COMMUNICATION STANDARD: PRODUCT ASSESSED IN ACCORDANCE WITH OSHA 29 CFR 1910.1200 AND DETERMINED NOT TO BE HAZARDOUS.

RCRA INFORMATION: THE UNUSED PRODUCT, IN OUR OPINION, IS NOT SPECIFICALLY LISTED BY THE EPA AS A HAZARDOUS WASTE (40 CFR, PART 261D); DOES NOT EXHIBIT THE HAZARDOUS CHARACTERISTICS OF IGNITABILITY, CORROSIVITY, OR REACTIVITY, AND IS NOT FORMULATED WITH THE METALS CITED IN THE EP TOXICITY TEST. HOWEVER, USED PRODUCT MAY BE REGULATED.

U.S. SUPERFUND AMENDMENTS AND REAUTHORIZATION ACT (SARA) TITLE III: THIS PRODUCT CONTAINS NO "EXTREMELY HAZARDOUS SUBSTANCES".

SARA (302) REPORTABLE HAZARD CATEGORIES: NONE

THIS PRODUCT CONTAINS NO CHEMICALS REPORTABLE UNDER SARA (313) TOXIC RELEASE PROGRAM.

THE FOLLOWING PRODUCT INGREDIENTS ARE CITED ON THE LISTS BELOW:

CHEMICAL NAME	CAS NUMBER	LIST CITATIONS
ZINC (ELEMENTAL ANALYSIS) (0.1%)	7440-66-6	15

--- KEY TO LIST CITATIONS ---

1 = OSHA 2, 2 = ACGIH, 3 = IARC, 4 = NTP, 5 = NCI,
6 = EPA CARC, 7 = NFPA 49, 8 = NFPA 325M, 9 = DOT HMT, 10 = CA RTK,
11 = IL RTK, 12 = MA RTK, 13 = MN RTK, 14 = NJ RTK, 15 = MI 293,
16 = FL RTK, 17 = PA RTK, 18 = CA P65.

--- NTP, IARC, AND OSHA INCLUDE CARCINOGENIC LISTINGS ---

NOTE: MOBIL PRODUCTS ARE NOT FORMULATED TO CONTAIN PCBS.

INFORMATION GIVEN HEREIN IS OFFERED IN GOOD FAITH AS ACCURATE, BUT WITHOUT GUARANTEE. CONDITIONS OF USE AND SUITABILITY OF THE PRODUCT FOR PARTICULAR USES ARE BEYOND OUR CONTROL: ALL RISKS OF USE OF THE PRODUCT ARE THEREFORE ASSUMED BY THE USER AND WE EXPRESSLY DISCLAIM ALL WARRANTIES OF EVERY KIND AND NATURE, INCLUDING WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE IN RESPECT TO THE USE OR SUITABILITY OF THE PRODUCT. NOTHING IS INTENDED AS A RECOMMENDATION FOR USES WHICH INFRINGE VALID PATENTS OR AS EXTENDING LICENSE UNDER VALID PATENTS. APPROPRIATE WARNINGS AND SAFE HANDLING PROCEDURES SHOULD BE PROVIDED TO HANDLERS AND USERS.

PREPARED BY: MOBIL OIL CORPORATION

ENVIRONMENTAL AFFAIRS AND TOXICOLOGY DEPARTMENT, PRINCETON, NJ
FOR FURTHER INFORMATION, CONTACT:

MOBIL OIL CORPORATION, PRODUCT FORMULATION AND QUALITY CONTROL
3225 GALLOWS ROAD, FAIRFAX, VA 22037 (703) 849-3265

SECTION E**USED AUTOMOTIVE OILS AND FILTERS****COURSE
OBJECTIVE**

The Objective of this course is to inform secondary level students of health and safety issues related to servicing today's vehicles, the regulations which affect the Automotive Service Industry, opportunities for preventing pollution and best management practices.

**SECTIONAL
OBJECTIVE**

Given an information sheet and learning activities you will learn about Used Automotive Oils and Filters. Your performance will be evaluated by the number of correct answers you achieve on the post test. A minimum score of 80% is required to successfully complete this section.

**ENABLING
OBJECTIVE**

1. Identify why fresh engine oil is not hazardous waste but used oil is.
2. Identify the best management practices for handling used oil and used oil filters.
3. Identify the recycling opportunities for used engine oil.

SECTION E**USED AUTOMOTIVE OILS AND FILTERS****PRE-TEST
QUESTIONS**

Choose the one correct answer:

1. Fresh engine oil out of a sealed container is:
A) A hazardous waste. B) likely contaminated.
C) An automotive lubricant D) Highly toxic.
2. Used engine oil is:
A) A hazardous waste. B) A non-hazardous waste.
C) Un-contaminated D) Exempt from regulation
- 3) All of the practices listed below are good used oil management techniques except for:
A) Designate a waste storage area.
B) Use drip pans to avoid spills.
C) Label used oil drums "Wastes".
D) Use absorbent pads instead of absorbent clay.
- 4) The best management practice for a used oil filter includes all of the practices listed below except for:
A) "Hot Drain" the filter after removal.
B) Allow filter to drain for 2 hours before disposal.
C) Ship used oil filters to a recycler.
D) Collect used oil during the "Hot Drain" into a drum.
- 5) Used engine oil can be mixed with:
A) Water
B) Solvent
C) Brake fluid
D) Gear lube

SECTION E

USED AUTOMOTIVE OILS AND FILTERS

INFORMATION SHEET

USED AUTOMOTIVE OILS

Health and Safety Issues:

Motor oil becomes contaminated through normal use by the breakdown of the additives in the oil and gasoline. The lead found in used motor oil is a result of contamination by leaded gasoline and is slowly declining with the change in formulation of gasoline. Other contaminants which may be present in used oil are zinc, chlorinated solvent, benzene, toluene, xylene, and naphthalene. These contaminants will determine the appropriate end route for the used oil but can also produce toxic effects in those who come in contact with it. Breathing difficulty, skin irritation, headaches are some of these symptoms. It is strongly recommended that technicians use gloves when performing oil change service.

Regulatory Issues:

Used motor oil is listed as a hazardous waste in the state of Massachusetts and must be managed according to the same regulations as other hazardous wastes. If it is stored indoors, storage drums must be on a surface which does not have any cracks or gaps, the storage area must be clearly marked off, and posted with a sign "HAZARDOUS WASTE" in capital letters at least one inch high. If it is stored outdoors, it must have "secondary containment" such as a berm or dike which will hold any spill or leaks at 10% of the total volume of the containers, or 110% of the volume of the largest container. Any spillage must be promptly removed.

Each container of waste oil must be clearly and visibly labeled "Hazardous Waste," "Waste Oil" and "Toxic" and with the date on which the first drop of oil was put in the container. At no time should other fluids be mixed with the waste oil. Containers should be tightly closed except when oil is being added or removed. The accumulation area should be checked at least once a week for any leaking or deterioration of the containers.

Pollution Prevention Opportunities:

Use of new longer-lasting synthetic oils may reduce the number of oil changes required in any given vehicle. Electric-powered vehicles do not use oil. Increased availability of public transportation is another way of reducing the volume of waste oil.



E-1



E-2



E-3

SECTION E

USED AUTOMOTIVE OILS AND FILTERS

INFORMATION SHEET

Best Management Practice:

1. Use drip pans or other portable containment to avoid the use of absorbents to clean up the bay during oil changes.
2. The Technician's goal should be completing the oil and filter change service without spilling a drop!
3. Designate a waste storage area. Instruct workers to keep waste oil separate from other liquid wastes.
4. Label containers "Hazardous Waste", "Waste Oil" and "Toxic".
5. Oily debris for clean-up must be kept to a minimum. Absorbent towels and line sponges are now available as well as corn cob absorbent that can be incinerated.
6. No mixing of other materials with used waste oil should be allowed to occur. (In general, transmission oil and gear lube oil are defined as a used oil and may be added to the used oil container).

The company that is removing the used waste oil will "backcharge" the generator if the used waste oil is found to contain significant amounts of other chemicals.

Disposal Options:

1. Ship the accumulated oil with a licensed hazardous waste transporter to an approved oil burning facility. Typically your oil will be blended with other grade oils to meet federal specifications for lead and halogen content prior to being burned for energy recovery. A hazardous waste manifest will record the shipment.
2. Ship your oil to a re-refinery. This allows your oil to be redirected into the broader market as a base stock.
3. Recover heat by burning the waste oil in a state fire marshal-approved waste oil fired space heater. This option requires that the shop owner obtain a Level I recycling permit from the Department of Environmental Protection. It is illegal to use these heaters in June, July, and August.

SECTION E

USED AUTOMOTIVE OILS AND FILTERS

INFORMATION SHEET

USED OIL FILTERS

Health and Safety Issues:

Oil filters are designed to remove particulate matter from the oil. Both lead and benzene, known toxics, have been found in spent filter paper. To avoid skin contact, workers should wear impervious clothing and gloves during handling. Spent oil filters also contain significant amounts of free-flowing oil, which is classified as a hazardous waste in Massachusetts.

Regulatory Issues:

Waste oil is a regulated hazardous waste in Massachusetts. Therefore, DEP encourages the recycling, or processing, of used oil filters and establishing a management approach. To meet the basic federal and state requirements, technicians who change oil must puncture and drain the removed filter for a minimum of 12 hours. The filter can then be managed as a solid waste, rather than a hazardous waste, but all free-flowing oil must be managed as a hazardous waste.

Pollution Prevention Opportunities:

Use of new longer-lasting synthetic oils may reduce the number of oil changes required in a vehicle. Electric-powered vehicles will not contain oil filters.

Best Management Practices:

The engine should be at operating temperature before performing an oil and filter change service. The used oil filter contains 12 ounces or more of used oil. To remove as much of this as possible, the technician must select one of the following practices:

1. After removal, puncture the filter anti-drain back valve or the filter dome end and "hot drain" for a minimum of 12 hours into a used oil collection drum. At the end of this period the filter may be discarded in the solid waste trash.
2. After removal, "hot drain" and crush the filter, allowing the free-flowing oil to drain into a used oil collection drum. The filter may then be discarded in the solid waste trash.
3. After removal, "hot drain" and dismantle (typically the drained filters will be shipped in a 55 gallon drum to an off-site processor who will mechanically separate the components into scrap metal, filter element, and recovered oil.)

Option number 3 is considered to be the most environmentally responsible method. The company that is removing the used waste oil will "backcharge" the generator if the used waste oil is found to contain significant amounts of other chemicals.

SECTION E

USED AUTOMOTIVE OILS AND FILTERS

LEARNING ACTIVITY

A. "DON'T DRINK THE WATER?"

This learning activity is a graphic illustration of what can happen to our drinking water source through the incorrect disposal of Used Automotive Oil.

1. Show the students a sealed bottle of spring water.
2. Ask the students if they know anyone who uses spring water and why?
3. Why does spring water come in sealed containers?
4. Why do people dislike tap water?
5. Open the sealed bottle of water and take a drink from it.
6. Now place a few drops of used engine oil in the just opened water container.
7. Explain and show the water container to the students.
8. Explain how this is what can happen to the ground water through the improper disposal of Used Automotive Oil.
9. Ask the students if anyone wants to drink the water in the bottle now.

SECTION E**USED AUTOMOTIVE OILS AND FILTERS****LEARNING
ACTIVITIES****B. CALCULATE THE TOTAL AMOUNT OF USED OIL
GENERATED ON YOUR STREET.**

1. The average automobile has 4 quarts of oil in the crankcase.
2. Elm street residents have 20 automobiles.
3. The manufacturer suggests that engine oil should be changed every three months.
4. Every vehicle owner follows the manufacturers' recommendations.
5. How many gallons of used oil will be collected and recycled from Elm street in a 12 month period?
6. Where can you return used oil in your town?
7. Have you seen any signs in your town indicating they accept used oil?

ANSWERS

Question 5: 20 vehicles

Question 6: 4 quarts times 4 equals 16 quarts per vehicle per year.

Question 7: 20 vehicles on Elm street x 16 quarts = 320 quarts per year or 80 gallons per year for one street!

SECTION E

USED AUTOMOTIVE OILS AND FILTERS

LEARNING ACTIVITIES

C. IDENTIFY USED OIL GENERATORS.

1. Have the students form teams of no more than four members.
2. Have each group make up a list of possible places where there may be used oil.
 - A. Gasoline Service Station
 - B. Automobile repair shop
 - C. New Car Dealerships
 - D. Fast lube specialty shop
 - E. Chain Stores (Sears, Kmart)
 - F. Auto Recycle yards
 - G. Auto Rental Shops (Avis)
 - H. Town or State garages
3. Are the people that sell engine oil required to take back the used oil?
4. Should there be a deposit on new oil to help remind people that their used oil should be brought back for recycling. How is this recycling opportunity different from the bottle bill?

SECTION E**USED AUTOMOTIVE OILS AND FILTERS****POST TEST**

Choose the one correct answer:

1. Fresh engine oil out of a sealed container is:
A) A hazardous waste. B) likely contaminated.
C) A non-hazardous waste. D) Highly toxic.
2. Used engine oil is:
A) A hazardous waste. B) A non-hazardous waste.
C) Un-contaminated D) Exempt from regulation
- 3) All of the practices listed below are good used oil management techniques except for:
A) Designate a waste storage area.
B) Use drip pans to avoid spills.
C) Label used oil drums "Wastes".
D) Use absorbent pads instead of absorbent clay.
- 4) Proper disposal of a used oil filter includes all of the practices listed below except for:
A) "Hot Drain" the filter after removal.
B) Allow filter to drain for 2 hours before disposal.
C) Ship used oil filters to a recycler.
D) Collect used oil during the "Hot Drain" into a drum.
- 5) Used engine oil can be mixed with:
A) Water B) Solvent
C) Brake fluid D) Gear lube

SECTION E

USED AUTOMOTIVE OILS AND FILTERS

**PRE- AND
POST- TEST
ANSWER KEY**

1. C
2. A
3. C
4. B
5. D

**INFORMATION
RESOURCES**

For additional information call the Department of Environmental Protection Compliance Assistance line at (617-292-5898)



005310

CARQUEST 10W40

Page: 1

THIS MSDS COMPLIES WITH 29 CFR 1910.120D (THE HAZARD COMMUNICATION STANDARD)

Product Name: CARQUEST 10W40
CAS NUMBER: IG LIST - -B.W.P. DISTRIBUTORS INC.
CARQUEST CORPORATION
1055 BRONX RIVER AVE

08 70 000 0813563-089

Data Sheet No: 0164091-009
Prepared: 04/23/90
Supersedes: 10/17/88

BRONX NY 10472

PRODUCT: 52015414
INVOICE: 050970
INVOICE DATE: 04/26/90
TO:

ATTN: PLANT MGR / SAFETY DIR.

SECTION I-PRODUCT IDENTIFICATION

General or Generic ID: PETROLEUM BASED-LUBRICATING OIL

DOT Hazard Classification: NOT APPLICABLE

SECTION II-COMPONENTS

IF PRESENT, IARC, NTP AND OSHA CARCINOGENS AND CHEMICALS SUBJECT TO THE REPORT-
ING REQUIREMENTS OF SARA TITLE III SECTION 313 ARE IDENTIFIED IN THIS SECTION.
SEE DEFINITION PAGE FOR CLARIFICATION.

INGREDIENT	% (by WT)	PEL	TLV	Note
DETERGENT/DISPERSANT ENGINE OIL PACKAGE	10-15	5 MG/M3		(1)
PETROLEUM LUBE OIL CAS #: 64742-65-0		5 MG/M3	5 MG/M3	(2)

Notes:

- (1) THIS PRODUCT CONTAINS A MAXIMUM OF 10% ZINC COMPOUNDS. ZINC COMPOUNDS ARE REPORTABLE UNDER SECTION 313 OF SARA TITLE III
- (2) PEL/TLV IS FOR OIL MIST. ACGIH SHORT TERM EXPOSURE LIMIT (STEL) FOR OIL MIST IS 10 MG/CUM.

SECTION III-PHYSICAL DATA

Boiling Point	UNAVAILABLE
Vapor Pressure	NOT APPLICABLE
Specific Vapor Density	HEAVIER THAN AIR
Specific Gravity	.877 @ 60.00 Deg F (15.55 Deg C)
Percent Volatiles	NOT APPLICABLE
Evaporation Rate	SLOWER THAN ETHER
State	LIQUID
Form	HOMO SOLN

SECTION IV-FIRE AND EXPLOSION INFORMATION

FLASH POINT > 400.0 Deg F (204.4 Deg C)

EXPLOSIVE LIMIT UNAVAILABLE

EXTINGUISHING MEDIA: REGULAR FOAM OR CARBON DIOXIDE OR DRY CHEMICAL

HAZARDOUS DECOMPOSITION PRODUCTS: MAY FORM TOXIC MATERIALS:, CARBON DIOXIDE AND CARBON MONOXIDE, VARIOUS HYDROCARBONS, ETC.

FIREFIGHTING PROCEDURES: WEAR SELF-CONTAINED BREATHING APPARATUS WITH A FULL FACEPIECE OPERATED IN THE POSITIVE PRESSURE DEMAND MODE WHEN FIGHTING FIRES.

WATER OR FOAM MAY CAUSE FROTHING WHICH CAN BE VIOLENT AND POSSIBLY ENDANGER THE LIFE OF THE FIREFIGHTER, ESPECIALLY IF SPRAYED INTO CONTAINERS OF HOT, BURNING LIQUID.

SPECIAL FIRE & EXPLOSION HAZARDS: NEVER USE WELDING OR CUTTING TORCH ON OR NEAR DRUM (EVEN EMPTY) BECAUSE PRODUCT (EVEN JUST RESIDUE) CAN IGNITE EXPLOSIVELY.

NFPA CODES: HEALTH- 1 FLAMMABILITY- 1 REACTIVITY- 0

SECTION V-HEALTH HAZARD DATA

PERMISSIBLE EXPOSURE LEVEL: NOT ESTABLISHED FOR PRODUCT. SEE SECTION II.

EFFECTS OF ACUTE OVEREXPOSURE: FOR COMPONENT

TOXICOLOGICAL TESTING INDICATES THAT SIMILAR PRODUCTS ARE NOT HAZARDOUS AS DEFINED BY OSHA (29 CFR 1910.1200).

FIRST AID:

IF ON SKIN: THOROUGHLY WASH EXPOSED AREA WITH SOAP AND WATER. REMOVE CONTAMINATED CLOTHING. LAUNDER CONTAMINATED CLOTHING BEFORE RE-USE.

005310

CARQUEST 10W40

Page: 2

SECTION IV-HEALTH HAZARD DATA (Continued)

IF IN EYES: FLUSH WITH LARGE AMOUNTS OF WATER, LIFTING UPPER AND LOWER LIDS OCCASIONALLY, GET MEDICAL ATTENTION.
IF SWALLOWED: DO NOT INDUCE VOMITING, KEEP PERSON WARM AND QUIET, AND GET MEDICAL ATTENTION.
IF BREATHED: IF AFFECTED, REMOVE INDIVIDUAL TO FRESH AIR. IF BREATHING IS DIFFICULT, ADMINISTER OXYGEN. IF BREATHING HAS STOPPED GIVE ARTIFICIAL RESPIRATION. KEEP PERSON WARM, QUIET AND GET MEDICAL ATTENTION.

SECTION VI-REACTIVITY DATA

HAZARDOUS POLYMERIZATION: CANNOT OCCUR
STABILITY: STABLE
INCOMPATIBILITY: AVOID CONTACT WITH: STRONG OXIDIZING AGENTS.

SECTION VII-SPILL OR LEAK PROCEDURES

STEPS TO BE TAKEN IN CASE MATERIAL IS RELEASED OR SPILLED:

SMALL SPILL: ABSORB LIQUID ON PAPER, VERMICULITE, FLOOR ABSORBENT OR OTHER ABSORBENT MATERIAL.
LARGE SPILL: PREVENT RUN-OFF TO SEWERS, STREAMS OR OTHER BODIES OF WATER. IF RUN-OFF OCCURS, NOTIFY PROPER AUTHORITIES AS REQUIRED, THAT A SPILL HAS OCCURED.
PERSONS NOT WEARING PROTECTIVE EQUIPMENT SHOULD BE EXCLUDED FROM AREA OF SPILL UNTIL CLEAN-UP HAS BEEN COMPLETED. STOP SPILL AT SOURCE, DIKE AREA OF SPILL TO PREVENT SPREADING. PUMP LIQUID TO SALVAGE TANK. REMAINING LIQUID MAY BE TAKEN UP ON SAND, CLAY, EARTH, FLOOR ABSORBENT, OR OTHER ABSORBENT MATERIAL AND SHOVELED INTO CONTAINERS.

WASTE DISPOSAL METHOD:

SMALL SPILL: DISPOSE OF IN ACCORDANCE WITH ALL LOCAL, STATE AND FEDERAL REGULATIONS.
LARGE SPILL: DESTROY BY LIQUID INCINERATION.
DISPOSE OF IN ACCORDANCE WITH ALL LOCAL, STATE AND FEDERAL REGULATIONS.

SECTION VIII-PROTECTIVE EQUIPMENT TO BE USED

RESPIRATORY PROTECTION: NOT REQUIRED UNDER NORMAL CONDITIONS OF USE.
VENTILATION: NOT REQUIRED UNDER NORMAL CONDITIONS OF USE.
PROTECTIVE GLOVES: NOT NORMALLY REQUIRED.
EYE PROTECTION: NOT REQUIRED UNDER NORMAL CONDITIONS OF USE.
OTHER PROTECTIVE EQUIPMENT: NORMAL WORK CLOTHING COVERING ARMS AND LEGS.

SECTION IX-SPECIAL PRECAUTIONS FOR OTHER COMMENTS

CONTAINERS OF THIS MATERIAL MAY BE HAZARDOUS WHEN EMPTIED. SINCE EMPTIED CONTAINERS RETAIN PRODUCT RESIDUES (VAPOR, LIQUID, AND/OR SOLID), ALL HAZARD PRECAUTIONS GIVEN IN THIS DATASHEET MUST BE OBSERVED.

THE INFORMATION ACCUMULATED HEREIN IS BELIEVED TO BE ACCURATE BUT IS NOT WARRANTED TO BE WHETHER ORIGINATING WITH THE COMPANY OR NOT. RECIPIENTS ARE ADVISED TO CONFIRM IN ADVANCE OF NEED THAT THE INFORMATION IS CURRENT, APPLICABLE, AND SUITABLE TO THEIR CIRCUMSTANCES.

SECTION X-LABEL INFORMATION

TOXICOLOGICAL TESTING INDICATES THAT SIMILAR PRODUCTS ARE NOT HAZARDOUS AS DEFINED BY OSHA 29 CFR 1910.1200 OR FHSA 16 CFR 1500.

HANDLING & STORAGE:

DO NOT TRANSFER TO UNLABELED CONTAINER. DO NOT USE CUTTING OR WELDING TORCH ON THIS CONTAINER (EVEN EMPTY). FOR INDUSTRIAL USE ONLY REFER TO MATERIAL SAFETY DATA SHEET (AVAILABLE UPON REQUEST) FOR FURTHER INFORMATION. 24-HOUR EMERGENCY NUMBER 1-800-ASHLAND.

FIRST AID:

EYES: FLUSH THOROUGHLY WITH WATER. GET MEDICAL ATTENTION IMMEDIATELY.
SKIN: WASH THOROUGHLY WITH SOAP AND WATER.
INGESTION: DO NOT INDUCE VOMITING. CALL A PHYSICIAN OR POISON CONTROL CENTER IMMEDIATELY. NEVER GIVE ANYTHING BY MOUTH TO AN UNCONSCIOUS PERSON.

CHRONIC INFORMATION:

CONTAINS: PETROLEUM OIL

*** COMPONENTS APPEAR IN SECTION II ***

Automobile Oil Flow Chart...

In the United States

1.2 billion gallons
automobile lubricating
oil produced
annually

1,200,000,000 Gallons

...lost* through
evaporation/
combustion
throughout
process of use

consumed in use

600 million gallons
50%

600 million gallons
Used Motor
Oil
50%

32%

4%

220 mil
DIY
18.3%

380 mil gal.
commercially
collected

50 million gallons
re-refined

...recycled
lubricating
oil

A. 16%
200 mil
gallons
uncontrolled
disposal

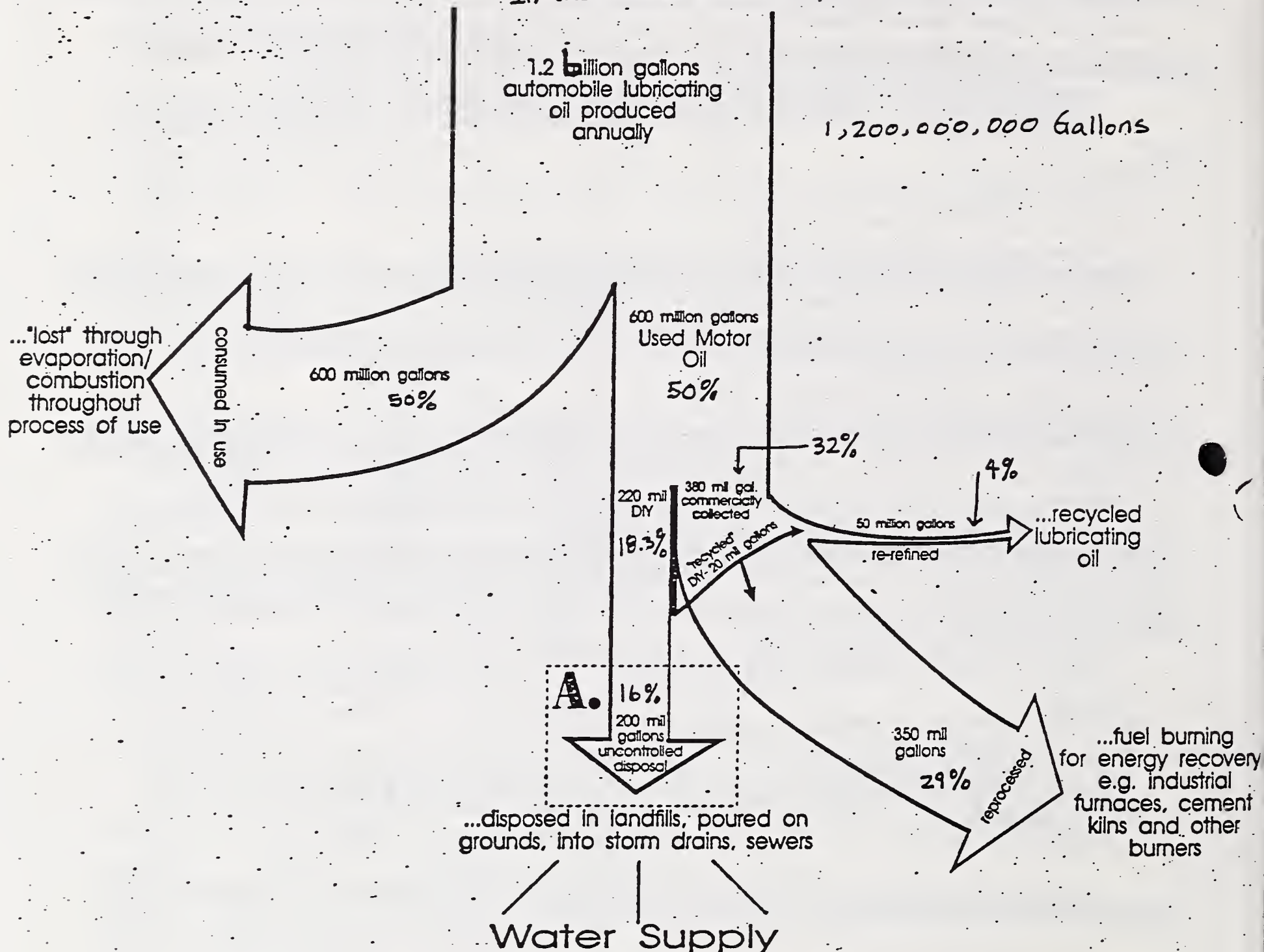
...disposed in landfills, poured on
grounds, into storm drains, sewers

Water Supply

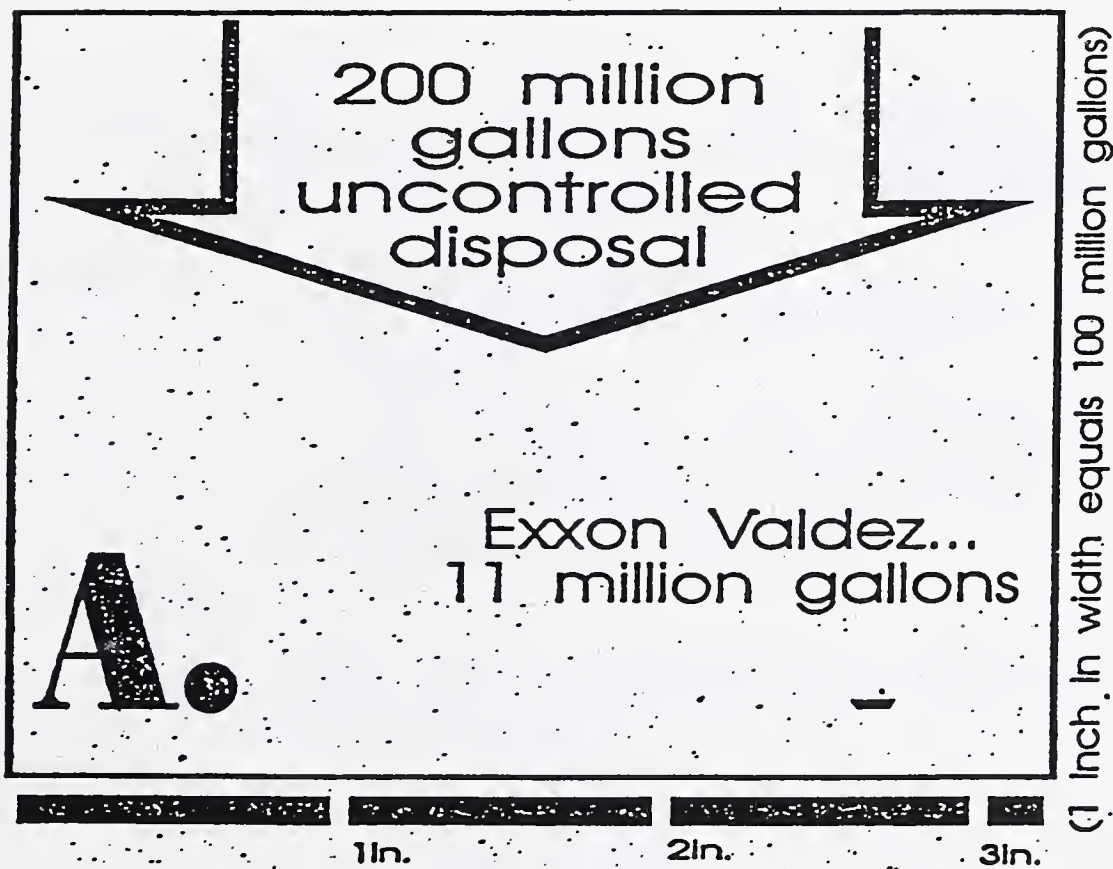
350 mil
gallons
29%

reprocessed

...fuel burning
for energy recovery
e.g. industrial
furnaces, cement
kilns and other
burners



Estimated Annual DIY Uncontrolled Disposal
as compared to that of the Exxon Valdez Spill



SECTION F**ENGINE COOLANT (ANTI-FREEZE)****COURSE
OBJECTIVE**

The Objective of this course is to inform secondary level students of health and safety issues related to servicing today's vehicles, the regulations which affect the Automotive Service Industry, opportunities for preventing pollution and best management practices.

**SECTIONAL
OBJECTIVE**

Given a information sheet and learning activities you will learn about Engine Coolant (Antifreeze). Your performance will be evaluated by the number of correct answers you achieve on the post test. A minimum score of 80% is required to successfully complete this section.

**ENABLING
OBJECTIVE**

1. Identify the chemical composition of engine coolant.
2. Explain the current regulations regarding disposal.
3. Identify the recycling opportunities for spent antifreeze.

SECTION F**ENGINE COOLANT (ANTI-FREEZE)****PRE-TEST**

Choose the one correct answer:

1. The active ingredient in engine coolant is:
A) Propylene Glycol B) Iso Alcohol
C) Methanol D) Ethylene Glycol

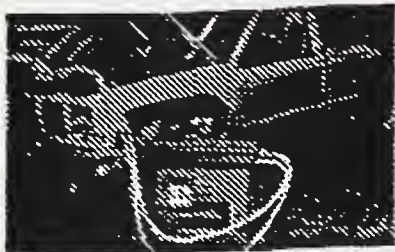
2. Triethanolamine is a:
A) Flushing agent B) Freeze protector
C) Corrosion Inhibitor D) Lubricant

3. Engine Coolant (Antifreeze) is :
A) Non-Toxic B) Severely Toxic
C) Moderately Toxic D) Slightly Toxic

4. Current disposal options for used engine coolant include all of the following except:
A) On-site recycling B) Off-site recycling
C) Testing the anti-freeze to determine toxicity.
D) Disposal down the sewer drain.

5. Engine Coolant (Anti-freeze) must not be discharged into a sewer or septic system because:
A) It reacts with water. B) It may contain lead.
C) It will rust the pipes. D) It will cause leaks.

INFORMATION SHEET



F-1



F-2

SECTION F

ENGINE COOLANT (ANTI-FREEZE)

Health and Safety Issues:

Ethylene glycol, the active ingredient in most antifreeze, is considered to be moderately toxic. Triethanolamine, a corrosion inhibitor in automotive coolants, has been linked to cancer in laboratory animals. Animals drinking antifreeze spilled on the ground may suffer adverse effect and possibly death.

NIOSH (National Institute for Occupational Safety and Health) guidance advises use of protective clothing and goggles, washing immediately upon contamination and change of clothes after work is finished. Symptoms from inhalation, skin absorption, ingestion, or skin or eye contact may be throbbing head, dizziness, skin irritation, nausea, vomiting, abdominal pain, flush, palpitation, delirium and angina. Target organs are the cardiovascular system, blood and skin.

Regulatory Issues:

Antifreeze drained from older cars with lead-soldered radiators is likely to contain lead and other contaminants which, if present at elevated levels, may classify it as a regulated waste.

Disposal Issues:

DEP advises that antifreeze not be discharged to a sewer or to a septic system because of possible metal content. It can be deadly to animals. At all times containers should be kept tightly closed. Spent antifreeze is not classified as a hazardous waste unless it fails a Toxicity Characteristic (TC) test. This test may cost between \$400- 1,000.

Current Disposal Options Are:

1. Testing the antifreeze for the hazardous waste characteristic of toxicity through a laboratory to determine whether or not it is a hazardous waste. If shipped as a hazardous waste, the regulatory burden on the service shop may increase because of the higher monthly volumes.
2. On-site recycling equipment is now available, costs range from \$2,000-\$20,000. Some models of equipment, after performing filtration and reintroducing inhibitors back into the antifreeze, will recycle the antifreeze back into the customer's vehicle. Other models perform larger quantity recycling separate from the customer's vehicle.
3. Off-site recycling where the generator collects and stores the spent antifreeze and has a service company transport the spent anti-freeze to a treatment facility for recycling.

SECTION F

ENGINE COOLANT (ANTI-FREEZE)

INFORMATION SHEET

Best Management Practice:

Wear protective clothing when flushing coolant, store the spent coolant in containers which are labeled "SPENT COOLANT", with the date accumulation began. Keep containers tightly closed.

Note that some companies are selling "propylene glycol", an anti-freeze used in mobile homes and boats, as a substitute for ethylene glycol in the automotive application. Propylene glycol may not be approved by the automotive manufacturer for use in their engines.

SECTION F

ENGINE COOLANT (ANTI-FREEZE)

LEARNING ACTIVITY

A. "HOW MUCH SPENT ANTIFREEZE DOES MY STREET CREATE?"

1. The average amount of coolant found in the automobile is approximately 2 gallons.
2. Have the students record the number of households on their street.
3. Most manufacturers recommend antifreeze be changed every 2 years.
4. The average American family has two vehicles per household.
5. How much spent antifreeze does your street produce every two years? (In gallons)
6. How does your community handle the spent coolant problem?

ANSWERS

Question 5- A 50 household street = 100 vehicles

100 automobiles times two gallons = 200 gallons every 2 years of spent antifreeze!

SECTION F**ENGINE COOLANT (ANTI-FREEZE)****LEARNING
ACTIVITIES****B. "TOXIC EFFECT OF ANTIFREEZE ON HUMANS AND
ANIMALS"**

1. What is the procedure when someone or some animal is suspected to have swallowed antifreeze?
2. Why is time important?
3. List what you are not to do?
4. Do you have a Poison Alert Center telephone number near your phone?
5. Do you have a veterinarian's telephone number near your phone?

ANSWERS

1. Get the person or animal medical help right away.
2. There are treatments which can quickly nullify the poison in the antifreeze.
3. DO NOT induce the person or animal to vomit.
4. Self-study
5. Self-study

SECTION F**ENGINE COOLANT (ANTI-FREEZE)****POST-TEST**

Choose the one correct answer:

1. The active ingredient in engine coolant is:
A) Propylene Glycol B) Iso Alcohol
C) Methanol D) Ethylene Glycol

2. Triethanolamine is a:
A) Flushing agent B) Freeze protector
C) Corrosion Inhibitor D) Lubricant

3. Engine Coolant (Antifreeze) is :
A) Non-Toxic B) Severely Toxic
C) Moderately Toxic D) Slightly Toxic

4. Current disposal options for used engine coolant include all of the following except:
A) On-site recycling B) Off-site recycling
C) Testing the anti-freeze to determine toxicity.
D) Disposal down the sewer drain.

5. Engine Coolant (Anti-freeze) must not be discharged into a sewer or septic system because:
A) It reacts with water. B) It may contain lead.
C) It will rust the pipes. D) It will cause leaks.

SECTION F**ENGINE COOLANT (ANTI-FREEZE)****PRE- AND
POST- TEST
ANSWER KEY**

1. D
2. C
3. B
4. D
5. B

**INFORMATION
RESOURCES**

For additional information call the Department of Environmental Protection
Compliance Assistance Line at (617-292-5898)

MSDS PAGE ONE

MATERIAL SAFETY DATA SHEET

FORMULA C-450

MSDS NO.	900603	WARNING! MAY CAUSE IRRITATION. CONTAINS ETHYLENE GLYCOL. HARMFUL OR FATAL IF SWALLOWED. MAY CAUSE DAMAGE TO BRAIN, KIDNEY, OR LIVER. Avoid contact with eyes, skin and clothing. Avoid breathing vapor or mist. Keep container closed. Use with adequate ventilation. Wash thoroughly after handling. For industrial use only; not for household use.
DATE	10/1/90	
EMERGENCY NUMBERS:		
CHEMTREC:	800/424-9300	
GENERAL INFORMATION:		
INTAC:	708/739-0606	

SECTION I - IDENTIFICATION

PRODUCT: Toyota Long Life Antifreeze/Coolant

SYNONYMS: Antifreeze C-450

CHEMICAL FAMILY: Ethylene Glycol solution of salts

CAS RN: Mixture - no single CAS number applicable

SECTION II - INGREDIENTS

<u>COMPONENTS</u>	<u>CAS RN</u>	<u>NOMINAL %</u>	<u>PEL/TLV</u>	<u>HAZARD</u>
Ethylene glycol	107-21-1	85 - 95%	Ceiling: 50 ppm (125mg/m) [vapor and mist]	Respiratory irritant. Ingestion may produce liver, brain and kidney damage.
Diethylene glycol	111-46-6	Less than 5%	None	Ingestion may produce liver and kidney damage.
Hydrated in- organic acid, organic acid salts	pro- prietary	Less than 5%	PEL-TWA: 10mg/m TLV-TWA 1mg/m	Skin, eye and respiratory irritant. GI tract inflam- mation.
Water	7732-18-5	Less than 5%	None	None noted.

MSDS NO. 900603

FORMULA C-450

SECTION III - HEALTH INFORMATION

INHALATION: Breathing excessive levels of the vapor or mist can irritate the respiratory tract. Excessive vapor concentrations of the major component (ethylene glycol), as might be generated during heating of this material, have occasionally been reported to cause adverse effects on the blood-forming system and the nervous system.

INGESTION: The acute oral toxicities of the components of this mixture are as follows:

Ethylene Glycol: The lowest dose reported to produce death in humans was estimated to be 710 mg/kg body weight; for a person weighing 150 pounds, this would be equivalent to drinking about one and one-half (1.5) fluid ounces of pure ethylene glycol in a short period of time.

Acute oral LD50's	=4,700mg/kg(rats)
	=7,500 mg/kg(mice)
	=2,000mg/kg(cat)

Hydrated inorganic acid, sodium salt: The lowest dose of a similar compound reported to produce death in humans was estimated to be 709 mg/kg body weight; for a person weighing 150 pounds, this would be equivalent to swallowing about one-tenth (0.1) of a pound of the dry material in a short period of time.

Acute oral LD50's	
for a similar compound	=2,660mg/kg(rats)
	=2,000mg/kg(mice)

Diethylene glycol:

Acute oral LD50's	= 1,000mg/kg(humans)
	=14,800mg/kg(rats)
	= 9,000mg/kg(dog)

EYE CONTACT: Based on the pH and irritation potential of this mixture's constituents, the mist or liquid can be expected to cause mild to moderate irritation or inflammation of the eyes.

SKIN CONTACT: The acute dermal LD50 of the major component (ethylene glycol) of this product is 11,890mg/kg(rabbits). Based on the pH and the irritation potential of this mixture's constituents, the mist or liquid can be expected to cause mild to moderate irritation of the skin.

SECTION IV - OCCUPATIONAL EXPOSURE LIMITS

PEL (OSHA Permissible Exposure Limit): None established for mixture, See Section II.

TLV (ACGIH Threshold Limit Value): None established for mixture, See Section II.

MSDS NO. 900603

FORMULA C-450

SECTION V - EMERGENCY FIRST AID PROCEDURE

FOR OVER EXPOSURE BY:

SWALLOWING: If victim is conscious and able to swallow, quickly have victim drink water or milk to dilute. Do not give sodium bicarbonate, fruit juices or vinegar. Never give anything by mouth if victim is unconscious or having convulsions. Induce vomiting only if advised by physician or Poison Control Center. CALL PHYSICIAN OR POISON CONTROL CENTER IMMEDIATELY.

SKIN CONTACT: Immediately flush skin with plenty of water while removing contaminated clothing.

EYE CONTACT: Immediately flush eyes with plenty of cool water for at least 15 minutes. Do not permit victim to rub eyes. GET MEDICAL ATTENTION IMMEDIATELY.

INHALATION: Immediately remove victim to fresh air. If victim has stopped breathing give artificial respiration, preferably mouth-to-mouth. GET MEDICAL ATTENTION IMMEDIATELY.

SECTION VI - PHYSICAL DATA

BOILING POINT: More than 300 °F

MELTING POINT: (Freezing Point) less than 5 °F

VAPOR PRESSURE: Estimated 0.05 mm Hg at 20 °C

SPECIFIC GRAVITY (60 /60 °F): 1.142

VAPOR DENSITY (AIR=1): Not determined.

PH: 8.0

SOLUBILITY IN WATER: Infinite miscibility

APPEARANCE AND COLOR: Clear, slightly viscous, pale yellow liquid which may be dyed red.

SECTION VII - FIRE AND EXPLOSION HAZARDS

FLASH POINT: 248 °F

AUTO-IGNITION TEMPERATURE: Not determined (752 °F for ethylene glycol)

FLAMMABLE LIMITS IN AIR, % BY VOL. LOWER:	Not determined (3.2% for ethylene glycol)
UPPER:	Not determined (15.3% for ethylene glycol)

MSDS NO. 900603

FORMULA C-450

SECTION VII - FIRE AND EXPLOSION HAZARDS (CONTINUED)

NFPA RATING: HEALTH () FIRE () REACTIVITY () NO NFPA RATING (X)

(Does not apply to exposure hazards other than during a fire.) Major component (Ethylene glycol) has ratings of Health (1), Fire (1), Reactivity (0).

FIRE FIGHTING PROCEDURES: (Note: Individuals should perform only those firefighting procedures for which they have been trained.) Use water spray, dry chemical, foam or carbon dioxide. Use water to keep fire-exposed containers cool. If a spill or leak has not ignited, use water spray to disperse the vapors. Water spray may be used to flush spills away from fire and dilute spills to noncombustible proportions (see warning on water spray on hot glycol below.)

UNUSUAL FIRE & EXPLOSION HAZARDS: Fire fighters should wear self-contained breathing apparatus in the positive pressure mode with a full face piece when there is a possibility of exposure to smoke, fumes or hazardous decomposition products. Water spray may cause foaming of hot glycol so indirect application of water spray or use of other extinguishing media should be used on hot glycol.

SECTION VIII - REACTIVITY

STABILITY: Generally stable

HAZARDOUS POLYMERIZATION: Not likely to occur.

CONDITIONS AND MATERIALS TO AVOID: Avoid concentrated strong acids, oxidizing agents and bases. Do not expose to open flame.

HAZARDOUS DECOMPOSITION PRODUCTS: If pyrolyzed, thermal decomposition products of residue may include C, CO, CO₂, H₂O, NH₃, organic vapors and nitrogen-containing substances.

SECTION IX - EMPLOYEE PROTECTION

CONTROL MEASURES: Handle in the presence of adequate ventilation. Engineering controls should be used whenever feasible to maintain concentrations below acceptable exposure criteria (Sections II and IV), including enclosures and local exhaust ventilation.

RESPIRATORY PROTECTION: Where exposure is likely to exceed acceptable criteria (see Sections II and IV) and engineering controls are not feasible, use NIOSH/MSHA approved respiratory protection equipment. Respirators should be selected based on the form and concentration of contaminants in air and in accordance with OSHA (29 CFR 1910.134).

MSDS NO. 900603

FORMULA C-450

SECTION IX - EMPLOYEE PROTECTION (CONTINUED)

PROTECTIVE CLOTHING: Wear gloves and protective clothing which are impervious to the product for the duration of exposure if there is potential for skin contact.

EYE PROTECTION: Wear safety glasses meeting the specifications of ANSI Standard Z87.1 where no contact with the eye is anticipated. Chemical safety goggles meeting the specification of ANSI Standard Z87.1 should be worn whenever there is the possibility of splashing or other contact with the eyes.

SECTION X - ENVIRONMENTAL PROTECTION

ENVIRONMENTAL PRECAUTIONS: Avoid uncontrolled releases of this material. Where spills are possible, a comprehensive spill release response plan should be developed and implemented.

SPILL OR LEAK PROCEDURES: Wear appropriate respiratory equipment and protective equipment as described in Section IX. Contain spilled material. Transfer to secure containers. Where necessary, collect using absorbent media. In the event of an uncontrolled release of this material, the user should determine if the release is reportable under the applicable laws and regulations.

WASTE DISPOSAL: All recovered material should be packaged, labeled, transported, and disposed of or reclaimed in conformance with good engineering practices. Avoid landfilling of liquids. Reclaim where possible.

SECTION XI - REGULATORY CONTROLS

DEPARTMENT OF TRANSPORTATION:

DOT CLASSIFICATION: No DOT Classification.

DOT PROPER SHIPPING NAME: Not applicable.

OTHER DOT INFORMATION: Not applicable.

OTHER REGULATORY REQUIREMENTS:

Toxic Substance Control Act

This product is a mixture: therefore, it is not listed in the TSCA Inventory of Chemical Substances. All of the components of the mixture are listed in the TSCA Inventory of Chemical Substances.

SARA Hazard Categories: (as defined in Sections 311/312) Immediate/Acute Health Hazard; Delayed/Chronic Health Hazard

The product contains greater than 85% ethylene glycol (CAS #107-21-1) and is subject to the reporting requirements of Section 313 of Title III of the Superfund Amendments and Reauthorization Act of 1986 and 40 CFR part 372.

MSDS NO. 900603

FORMULA C-450

SECTION XII.- PRECAUTIONS: HANDLING, STORAGE AND USAGE

To prevent possible storage container rupture, do not permit to freeze; See Section VI.

Do not expose children and pets to this material.

Keep container closed.

Keep away from open flames.

After handling product, wash thoroughly with soap and water before drinking, eating, or smoking.

Container hazardous when emptied. Since emptied containers retain product residues, all hazardous precautions described on this MSDS must be observed.

The information presented herein is believed to be factual as it has been derived from the works and opinions of persons believed to be qualified experts; however, nothing contained in this information is to be taken as a warranty or representation for which INTAC Automotive Products, Inc. bears legal responsibility. The user should review any recommendation in the specific context of the intended use to determine whether they are appropriate.

PREPARED BY INTAC Automotive Products, Inc.

DATE: October 1, 1990

For further information contact:

SUPERSEDES: _____

Kiyoshi (James) Kajiura
INTAC Automotive Products, Inc.
NE Bank of Canal & Lemont Rd.
Lemont, IL 60439

(708)739-0606

SECTION G

PAINT AND THINNERS

COURSE OBJECTIVE

The Objective of this course is to inform secondary level students of health and safety issues related to servicing today's vehicles, the regulations which affect the Automotive Service Industry, opportunities for preventing pollution and best management practices.

SECTIONAL OBJECTIVE

Given a information sheet and learning activities you will learn about Paints and Thinners. Your performance will be evaluated by the number of correct answers you achieve on the post test. A minimum score of 80% is required to successfully complete this course.

ENABLING OBJECTIVE

1. Identify the hazardous wastes and air emissions generated in a body shop.
2. Discuss methods for minimizing hazardous waste and air emissions.
3. Identify recycling opportunities in the body shop.

SECTION G**PAINT AND THINNERS****PRE-TEST**

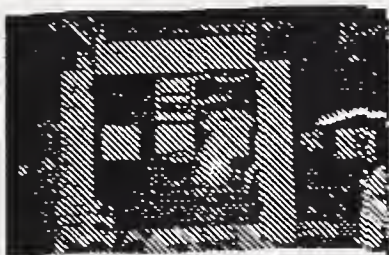
Choose the one correct answer:

1. The task below generates the largest volume of hazardous waste in a body shop.
A) Scraping off old paint. B) Grinding metal surfaces.
C) Wet sanding surfaces D) Painting of vehicles.
2. Body shop hazardous wastes are:
A) Corrosive B) Biodegradable
B) Ignitable C) Reactive
3. A respirator meeting "OSHA" standards must be used during:
A) Painting B) Grinding
C) Sanding D) All of the above.
4. High Volume, Low Pressure (HVLV) spray guns reduce VOC emissions by:
A) Using a solvent/paint mix.
B) Using water/paint mix.
C) Increasing paint quantity.
D) Minimizing overspray.
5. Spray gun cleaning should be done:
A) Outside
B) In the shop
C) In a spray gun cleaning booth
D) In the paint booth

SECTION G

PAINT AND THINNERS

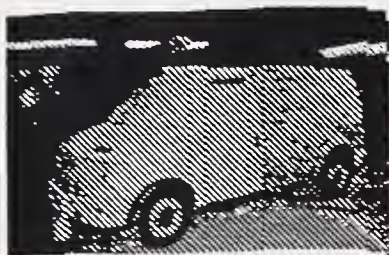
INFORMATION SHEET



G-1



G-2



G-3

Health and Safety Issues:

To perform collision repair, body shops use a wide range of equipment, chemicals and raw materials. Painting of vehicles generates the largest volume of hazardous wastes in a body shop. Leftover paint and dirty thinner resulting from equipment cleaning are the largest waste streams.

Automotive refinishing products have been targeted for control because of their "volatile organic compounds" (VOC'S) which contribute to a significant portion of pollution resulting in ground level ozone.

Body repair requires grinding metals and scraping fillers.

Paint refinishing requires use of an air type spray gun. In both of these cases the presence of residual dusts and mists is very high. An respirator meeting "OSHA" standards must be used in all of these cases to prevent the inhalation of these compounds.

Regulatory Issues:

Most of the hazardous wastes generated in a body shop are during the painting process, including: toxic and ignitable thinners, toxic paints and primer wastes, and empty cans with paint and thinner residues. These wastes must be managed according to all hazardous waste regulations.

Air emissions must be controlled and may require an air permit.

Pollution Prevention Opportunities:

Over the years new technologies have been developed to reduce the amount of hazardous wastes generated during the painting process. These include the use of water borne paints by major automotive manufacturers, as well as High Volume Low Pressure (HVLP) spray guns used by automotive body shops which reduce overspray thereby reducing VOCs.

Best Management Practice:

1. Rigid inventory control, Use only what you need, keep waste paint and thinners to a minimum. Store solvents and coatings in vapor tight containers.
2. Use dry collection methods such as sweeping or vacuuming for filler dusts.
3. Use high efficiency transfer equipment such as the High Volume Low Pressure (HVLP) spray gun.
4. Perform cleaning of spray equipment in an enclosed gun cleaning station.
5. Recycle spent solvent off site.
6. Use detergent-based surface preparation products.

SECTION G

PAINT AND THINNERS

**LEARNING
ACTIVITY**

**A. ROLE PLAY THE DIFFERENT PERSPECTIVES
REGARDING MANAGEMENT OF HAZARDOUS WASTE
IN A BODY SHOP.**

1. Form the class into teams of no more than four.
2. Have each team represent a different perspective:
 - A. Autobody Technician
 - B. Customer
 - C. Autobody Shop
 - D. DEP
3. Have each team answer the following questions from their perspective then meet back in a large group and have a team leader explain their answers to the group.
 - A. Why is managing hazardous waste important?
 - B. What are cost effective recycling techniques?
 - C. What is my responsibility to my community in managing hazardous waste?
 - D. How much should I charge for additional costs related to proper management of hazardous waste?
 - E. How can I prevent the possibility of a large hazardous waste spill?

SECTION G

PAINT AND THINNERS

POST TEST

Choose the one correct answer:

1. The task below generates the largest volume of hazardous waste in a body shop.
A) Scraping off old paint. B) Grinding metal surfaces.
C) Wet sanding surfaces. D) Painting of vehicles.

2. Body shop hazardous wastes are:
A) Corrosive B) Biodegradable
B) Ignitable C) Reactive

3. An OSHA approved respirator must be used during:
A) Painting B) Grinding
C) Sanding D) All of the above.

4. High Volume, Low Pressure (HVLP) spray guns reduce VOC emissions by:
A) Using a solvent/paint mix.
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C) Increasing paint quantity.
D) Minimizing overspray.

5. Spray gun cleaning should be done:
A) Outside
B) In the shop
C) In a spray gun cleaning booth
D) In the paint booth

SECTION G**PAINT AND THINNERS****PRE- AND
POST- TEST
ANSWER KEY**

1. D
2. B
3. D
4. D
5. C

**INFORMATION
RESOURCES**

For additional information contact:

Department of Environmental Protection, Air Quality Program (617-292-5630)

U.S. DEPARTMENT OF LABOR
OCCUPATIONAL SAFETY AND HEALTH ADMINISTRATION

MATERIAL SAFETY DATA SHEET

SECTION I

MANUFACTURER'S NAME & ADDRESS
DUPLI-COLOR PRODUCTS
1601 Nicholas Blvd.
Elk Grove Village, IL 60007

EMERGENCY TELEPHONE NO.
1-312-439-0600

TRADE NAME 1 fl. oz. BOTTLE of DP AUTO PAINT
FORMULA 409-1 ACRYLIC LACQUER

SECTION II - HAZARDOUS INGREDIENTS

RAW MATERIAL NAME	% WT.	TLV	CAS #
PIGMENTS AND/OR RESIN	23.40	N/A	-----
ETHYL ALCOHOL	3.80	1000	64-17-5
TOLUOL	25.60	100	108-88-3
METHYL ETHYL KETONE	19.80	200	78-93-3
METHYL ISOBUTYL KETONE	13.90	500	108-10-1
OXYL HEXYL ACETATE	13.50	25	88230-35-7

- PRODUCT IS LEAD FREE - TOTAL = 100.00 CALCULATED 11/15/85

—> THE TLV OF THE PRODUCT = 72

SECTION III - PHYSICAL DATA

BOILING POINT	= 230 deg. F	SPECIFIC GRAVITY (WATER = 1)	= -1
VAPOR PRESSURE (mm Hg)	= 17	% VOLATILE by VOLUME	= +/75
VAPOR DENSITY (AIR = 1)	= +1	EVAPORATION rate (BuAc = 1)	= -1
SOLUBILITY IN WATER	= SLIGHT		

APPEARANCE & ODOR - TYPICAL OF PAINT AND LACQUER

SECTION IV - FIRE AND EXPLOSION HAZARD DATA

* RED LABEL * EXTREMELY FLAMMABLE *

FLASH POINT 50 deg F. ASTM D-1310 LOWER EXPLOSION LIMIT = 1.2

EXTINGUISHING MEDIA: Carbon dioxide or foam.

SPECIAL FIRE FIGHTING PROCEDURES: Full protective equipment including self-contained breathing apparatus should be used. Water may be ineffective on fire but can be used to cool containers.

UNUSUAL FIRE and EXPLOSION HAZARDS: Do not use near open flames. Do not puncture aerosol can. Containers may explode when exposed to extreme heat.

(Continued on reverse side)

Form OSHA - 'MSDS-3'

U.S. DEPARTMENT OF LABOR
OCCUPATIONAL SAFETY AND HEALTH ADMINISTRATION

MATERIAL SAFETY DATA SHEET

SECTION I

MANUFACTURER'S NAME & ADDRESS
DUPLI-COLOR PRODUCTS
1601 Nicholas Blvd.
Elk Grove Village, IL 60007

EMERGENCY TELEPHONE NO.
1-312-439-0600

TRADE NAME 1 fl. oz. BOTTLE of DP AUTO PAINT
FORMULA 409-1 ACRYLIC LACQUER

SECTION II - HAZARDOUS INGREDIENTS

RAW MATERIAL NAME	% WT.	TLV	CAS #
PIGMENTS AND/OR RESIN	23.40	N/A	—
ETHYL ALCOHOL	3.80	1000	64-17-5
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METHYL ETHYL KETONE	19.80	200	78-93-3
METHYL ISOBUTYL KETONE	13.90	500	108-10-1
OXYL HEXYL ACETATE	13.50	25	88230-35-7

- PRODUCT IS LEAD FREE - TOTAL = 100.00 CALCULATED 11/15/85

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SECTION III - PHYSICAL DATA

BOILING POINT	= 230 deg. F	SPECIFIC GRAVITY (WATER = 1)	= -1
VAPOR PRESSURE (mm Hg)	= 17	% VOLATILE by VOLUME	= +/75
VAPOR DENSITY (AIR = 1)	= +1	EVAPORATION rate (BuAc = 1)	= -1
SOLUBILITY IN WATER	= SLIGHT		

APPEARANCE & ODOR - TYPICAL OF PAINT AND LACQUER

SECTION IV - FIRE AND EXPLOSION HAZARD DATA

* RED LABEL * EXTREMELY FLAMMABLE *

FLASH POINT 50 deg F. ASTM D-1310

LOWER EXPLOSION LIMIT = 1.2

EXTINGUISHING MEDIA: Carbon dioxide or foam.

SPECIAL FIRE FIGHTING PROCEDURES: Full protective equipment including self-contained breathing apparatus should be used. Water may be ineffective on fire but can be used to cool containers.

UNUSUAL FIRE and EXPLOSION HAZARDS: Do not use near open flames. Do not puncture aerosol can. Containers may explode when exposed to extreme heat.

(Continued on reverse side)

Form OSHA - 'MSDS-3'

THRESHOLD LIMIT VALUE - See Section II

EFFECTS of OVEREXPOSURE

ACUTE: In a confined area, vapors in high concentrations are anesthetic. Overexposure may result in lightheadedness and staggering gait. Also an irritant to skin & upper respiratory system.

CHRONIC: Reports have associated repeated and prolonged overexposure to solvents with permanent brain and nervous system damage.

EMERGENCY and FIRST AID PROCEDURES

IF INHALED: If Affected, Remove from exposure. Restore breathing. Keep warm & quiet.

IF on SKIN: Wash affected area thoroughly with soap & water. Remove contaminated clothing & launder before reuse.

IF in EYES: Flush eyes with large amounts of water for 15 minutes. Get medical attention.

IF SWALLOWED: Never give anything to an unconscious person. Give several glasses of water. Seek medical attention.

SECTION VI - REACTIVITY DATA

STABILITY - Stable

HAZARDOUS DECOMPOSITION PRODUCTS

By fire: Carbon Dioxide, Carbon Monoxide

HAZARDOUS POLYMERIZATION - Will not occur

SECTION VII - SPILL OR LEAK PROCEDURES

STEPS TO BE TAKEN IN CASE MATERIAL IS RELEASED OR SPILLED

Remove all sources of ignition. Ventilate and remove with inert absorbent.

WASTE DISPOSAL METHOD

Do not burn or incinerate. Dispose of in accordance with Federal, State and Local regulations regarding pollution.

SECTION VII - PROTECTION INFORMATION

PRECAUTIONS TO BE TAKEN IN USE

Use only with adequate ventilation. Avoid breathing vapor and spray mist. Avoid contact with skin and eyes. Wash hands after using. Protect against dust which may be generated by sanding or abrading the dried film.

VENTILATION

Local exhaust preferable. General exhaust acceptable if the exposure to materials in Section II is maintained below applicable limits.

RESPIRATORY PROTECTION

To avoid breathing vapors or spray mist, open windows and doors or use other means to ensure fresh air entry during application and drying. If you experience eye watering, headaches or dizziness, increase fresh air or wear respiratory protection (NIOSH/MSHA TC 23C or equivalent) or leave the area.

PROTECTIVE GLOVES

Wear solvent resistant gloves if desired.

EYE PROTECTION

Wear chemical splash goggles, face shield, or safety spectacles with unperforated side shields.

SECTION IX - SPECIAL PRECAUTIONS

PRECAUTIONS TO BE TAKEN IN HANDLING and STORAGE

Vapors may ignite explosively. Prevent build-up of vapors. Keep from sparks, heat, flame or other heat sources. Do not shake. Turn off pilot lights, stoves, heaters, electric motors, and other sources of ignition during use and until all vapors are gone. Do not puncture or incinerate (burn) container. Exposure to heat or prolonged exposure to sun may cause bursting. Do not expose to heat or store at temperatures above 120 degrees F. **DO NOT DISCARD EMPTY CONTAINER IN HOME GARBAGE CONTAINER.**

OTHER PRECAUTIONS

INTENTION MISUSE BY DELIBERATE CONCENTRATING AND INHALING THE CONTENTS MAY BE HARMFUL OR FATAL * KEEP AWAY FROM CHILDREN *

WRITTEN - 11/17/85 - PROG 'MS-162'

SECTION H**PARTS CLEANERS****COURSE
OBJECTIVE**

The Objective of this course is to inform secondary level students of health and safety issues related to servicing today's vehicles, the regulations which affect the Automotive Service Industry, opportunities for preventing pollution and best management practices.

**SECTIONAL
OBJECTIVE**

Given a information sheet and learning activities you will learn about Parts Cleaners. Your performance will be evaluated by the number of correct answers you achieve on the post test. A minimum score of 80% is required to successfully complete this section.

**ENABLING
OBJECTIVE**

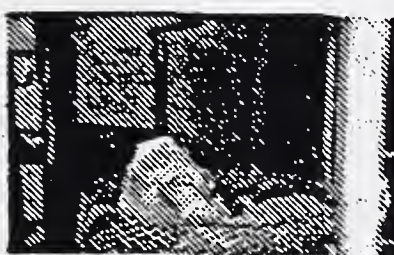
1. Identify the health hazards in working with parts cleaners.
2. Identify the alternative chemicals/operations available to minimize hazardous waste and air emissions.
3. List the recycling opportunities for spent parts cleaning solvents.
4. Identify the different classes of hazardous waste generators.

SECTION H

PARTS CLEANERS

PRE-TEST

1. The best source for specific information regarding the health and safety features of a parts cleaning fluid is:
A) The shipping label B) The invoice
C) The product brochure D) The MSDS
2. If the flashpoint of a chemical is below 140 Degrees it is:
A) Safe near a flame. B) Considered toxic.
C) Considered ignitable. D) Considered reactive.
3. If you generate between 27 - 270 gallons a month of hazardous waste you are considered a :
A) Large quantity generator (LQG)
B) Small quantity generator (SQG)
C) Very small quantity generator (VSQG)
D) Exempt from disposal regulations.
4. A good alternative to solvent based cleaners are:
A) High pressure washing
B) Aqueous cleaning machine.
C) Alkaline cleaners
D) Alternatives A-C.
5. Spent solvents should be disposed of by:
A) Pouring them down the drain.
B) Storing indefinitely.
C) Mixing with other wastes.
D) Having them transported to a recycling facility.

SECTION H**PARTS CLEANERS****INFORMATION
SHEET****H-1****H-2****H-3****Health and Safety Issues:**

There are several different chemicals used to clean parts and manufacturers are reformulating to make products which are reliable yet environmentally more friendly. Material Safety Data Sheets are the best source of specific information on the health and safety features of each of these products.

Users should note whether the flashpoint is below 140 degrees F. This determines whether the waste product is "ignitable" and therefore hazardous. Petroleum naphtha or mineral spirits may be ignitable. Degreasers such as immersion cleaner, cold parts cleaner, or carburetor cleaner are typically classified as hazardous, based on their solvent content. Technicians should keep solvent fumes from escaping by closing tubs except when parts are being added or removed. Also rubber gloves and eye protection should be worn during parts cleaning operations.

Regulatory Issues:

Parts cleaner which has been used and is no longer useful will be classified as a hazardous waste, regardless if it is going for recycling at another location. The frequency and quantity of pickup will depend on your "generator status." If you have less than 27 gallons per month, total of all hazardous waste, you do not have a time limit on how long you can accumulate this waste and you are classified as a "Very Small Quantity Generator (VSQG)." If your waste volume is over 27 gallons and under 270 gallons per month, you are classified as a "Small Quantity Generator" (SQG) and you must have your waste removed in six months. If your waste volume is over 270 gallons per month, you are classified as a "Large Quantity Generator" (LQG) and you must have your waste removed in three months. Some parts cleaners and degreasers are subject to new clean air act controls and permitting requirements.

SECTION H**PARTS CLEANERS****INFORMATION
SHEET****Pollution Prevention Opportunities:**

Aqueous (water) or alkaline cleaners may be substituted for solvent based cleaners in some applications, particularly for non-aluminum parts. High pressure washing may be an effective method of parts cleaning. Wastewater can be treated with an oil/water separator and be recycled.

Precleaning parts with a rag or wirebrush, followed by steam cleaning, high-pressure wash, or hot bath which recycles an aqueous solution using an oil separator, is an effective approach to minimizing or eliminating the use of hazardous solvents.

Best Management Practices:

1. Never mix or add spent or fresh solvents to used oil.
2. Never use gasoline as a cleaner or solvent.
3. Never pour solvents into drains.
4. Consider a two-step, precleaning/final cleaning system; use spent solvent in the precleaning tank.
5. Always keep lids of cleaning tanks closed to prevent evaporation and escape to the atmosphere.
6. Consider the use of a solvent supplier who will pickup and recycle the solvents.

SECTION H

PARTS CLEANERS

LEARNING ACTIVITY

A. ROLE PLAY THE DIFFERENT CHEMICALS USED IN VARIOUS INDUSTRIAL AND RESIDENTIAL APPLICATIONS.

1. Form teams of no more than four students.
2. Have each team name their team.

Example:

AL'S Auto Repair

Stan's Auto Body

Mr. and Mrs. Sullivan's house

Vocational School Inc.

3. Have each team list all possible cleaners used in the day-to-day operations of these applications.
4. Every time a team comes up with a cleaner they get one point.
5. At the end of the activity the team with the most points wins!

Ask the students if they have used any of these cleaners?

Ask the students what methods they used to protect themselves from the hazardous materials?

Ask the students what they did with the hazardous residue left over from the cleaning operation?

SECTION H

PARTS CLEANERS

POST-TEST

Choose the one correct answer:

1. The best source for specific information regarding the health and safety features of a parts cleaning fluid is:
A) The shipping label B) The invoice
C) The product brochure D) The MSDS
2. If the flashpoint of a chemical is below 140 degrees it is:
A) Safe near a flame. B) Considered toxic.
C) Considered ignitable. D) Considered reactive.
3. If you generate between 27 - 270 gallons a month of hazardous waste you are considered a :
A) Large quantity generator (LQG)
B) Small quantity generator (SQG)
C) Very small quantity generator (VSQG)
D) Exempt from disposal regulations.
4. A good alternative to solvent based cleaners are:
A) High pressure washing B) Aqueous cleaning machine.
C) Alkaline cleaners D) Alternatives A-C
5. Spent solvents should be disposed of by:
A) Pouring them down the drain.
B) Storing indefinitely.
C) Mixing with other wastes.
D) Having them transported to a recycling facility.

SECTION H**PARTS CLEANERS****PRE- AND
POST- TEST
ANSWER KEY**

1. D
2. C
3. B
4. D
5. D

**INFORMATION
RESOURCES**

For additional information:

Contact the Department of Environmental Protection Compliance Assistance line (617-292-5898)

For permit information under Clean Air Act Amendments call DEP'S Infoline at 617-338-2255 or 800-462-0444

SAFETY-KLEEN 105 SOLVENT

MATERIAL SAFETY DATA SHEET FOR U.S.A. AND CANADA

SECTION 1 – PRODUCT AND PREPARATION INFORMATION

PRODUCT INFORMATION

IDENTITY (TRADE NAME): SAFETY-KLEEN 105 SOLVENT

SYNONYMS: Mineral Spirits, Stoddard Solvent, Petroleum distillates, Petroleum naphtha

SK PART NUMBER(S): 6617

FAMILY/CHEMICAL NAME: Aliphatic hydrocarbon

PRODUCT USE: Cleaning and degreasing metal parts.
If this product is used in combination with other chemicals, refer to the Material Safety Data Sheets for those chemicals.

24-HOUR EMERGENCY TELEPHONE

These numbers are for emergency use only. If you desire non-emergency information about this product, please call a telephone number listed below.

MEDICAL:

1-800-752-7869 (U.S.A.)
1-312-942-5969 (CANADA)
RUSH POISON CONTROL CENTER
CHICAGO, ILLINOIS, U.S.A.

TRANSPORTATION:

1-708-888-4660 (U.S.A.)
SAFETY-KLEEN ENVIRONMENT,
HEALTH AND SAFETY DEPARTMENT
1-613-996-6666 (CANADA)
CANUTEC

MANUFACTURER/SUPPLIER: Safety-Kleen Corp. - 777 Big Timber Road - Elgin, IL, U.S.A. 60123
Telephone number: 1-800-669-5840
Safety-Kleen Canada Inc. - 3090 Blvd. Le Carrefour - Suite 300 - Chomedey Laval
Quebec, Canada H7T 2J7 Telephone number: 1-800-363-2260

PREPARATION INFORMATION

MSDS FORM NO.: 82310 **REVISION DATE:** January 15, 1992

ORIGINAL ISSUE DATE: July 20, 1989 **SUPERSEDES:** December 14, 1990

PREPARED BY: Product MSDS Coordinator **APPROVED BY:** MSDS Task Force

TELEPHONE NUMBER: For Product Technical Information Call 1-312-694-2700 (U.S.A.);
1-800-363-2260 (Canada)

SECTION 2 – HAZARDOUS COMPONENTS

NAME	SYNONYM	CAS NO.	WT%	OSHA PEL		ACGIH TLV		OTHER DATA	
				TWA (ppm)	STEL (ppm)	TWA (ppm)	STEL (ppm)	LD ^a	LC
Parts Washer Solvent (consists predominantly of C9-C13 saturated hydrocarbons)	Mineral Spirits	64741-41-9	85.0	100 ^c	N.Av.	100 ^c	N.Av.	>5000 ^c	>5500 ^{b,c} mg/m ³ /4 hours
C8 ⁺ Aromatics	N.Av.	mixture	12.0	N.Av.	N.Av.	N.Av.	N.Av.	N.Av.	N.Av.
*Xylene ^c	Dimethylbenzene	1330-20-7	1.0	100	150	100	150	4300	5000 ^b ppm/4 hours
*Ethylbenzene ^c	Phenylethane	100-41-4	0.5	100	125	100	125	3500	4000 ^d ppm/4 hours

SAFETY-KLEEN 105 SOLVENT

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MATERIAL SAFETY DATA SHEET FOR U.S.A. AND CANADA

*Toluene	Methylbenzene	108-88-3	0.5	100	150	100	150	5000	4000 ^d ppm/4 hours
*1,1,1-trichloroethane	Methyl chloroform	71-55-6	0-0.5**	350	450	350	450	10300	18000 ^b ppm/4 hours
*Perchloroethylene	Tetrachloro-ethylene	127-18-4	0-0.5**	25	N.Av.	50	200	2629	34200 ^b mg/m ³ /8 hours

N.Av. = Not Available

*See Section 9-Other Regulatory Information

**Even though the concentration range does not fall under the ranges prescribed by WHMIS, this is the actual range which varies with each batch of the product.

^aOral-Rat LD50 (mg/kg)

^bInhalation-Rat LC50

^cFor Stoddard Solvent

^dInhalation-Rat LCLo

^eConstituent of C8⁺ Aromatics

SECTION 3 – EMERGENCY AND FIRST AID PROCEDURES

EYES:	For direct contact, flush eyes with water for 15 minutes lifting upper and lower lids occasionally. If irritation or redness from exposure to vapor or mist develops, move victim away from exposure into fresh air. Consult physician if irritation or pain persists.
SKIN:	Remove contaminated clothing and shoes. Wash skin twice with soap and water. Consult physician if irritation or pain persists.
INHALATION: (Breathing)	Remove to fresh air immediately. Use oxygen if there is difficulty breathing or artificial respiration if breathing has stopped. Do not leave victim unattended. Seek immediate medical attention if necessary.
INGESTION: (Swallowing)	Seek immediate medical attention. Do NOT induce vomiting. If spontaneous vomiting occurs, keep head below hips to avoid aspiration (into lungs).
SPECIAL NOTE TO PHYSICIAN:	Treat symptomatically and supportively. Administration of gastric lavage, if warranted, should be performed by qualified medical personnel. Contact Rush Poison Control Center (see Section 1) for additional medical information.

SECTION 4 – HEALTH HAZARD DATA AND TOXICOLOGICAL PROPERTIES

PRIMARY ROUTES OF EXPOSURE: Eye and skin contact; inhalation, ingestion.

EXPOSURE LIMITS: See Section 2.

SIGNS AND SYMPTOMS OF EXPOSURE

ACUTE: *Eyes:* Contact with liquid or exposure to vapor may cause mild to moderate irritation with stinging, tearing or redness.

Skin: Contact tends to remove skin oils, possibly leading to irritation and dermatitis. No significant skin absorption hazard.

Inhalation (Breathing): High concentrations of vapor or mist may be irritating to the respiratory tract; may cause nausea; may cause headaches, dizziness, impaired coordination, anesthesia and other central nervous system effects.

Ingestion (Swallowing): Low order of acute oral toxicity. May cause irritation of the throat, nausea, vomiting, myocardial injury with arrhythmias and symptoms of central nervous system depression as listed for ACUTE Inhalation. Aspiration into the lungs during ingestion or vomiting may cause mild to severe pulmonary injury and possibly death.

CHRONIC: Prolonged or repeated skin contact may cause drying and cracking or dermatitis.

MATERIAL SAFETY DATA SHEET FOR U.S.A. AND CANADA

**MEDICAL CONDITIONS
AGGRAVATED BY
EXPOSURE:**

Individuals with pre-existing lung, cardiac, central nervous system or skin disorders may have increased susceptibility to the effects of exposure.

CARCINOGENICITY:

IARC classifies chemicals by their carcinogenic risk, including agents that are known, probable or possible carcinogens. NTP classifies chemicals as either known carcinogens or for which there is a limited evidence of carcinogenicity in humans or sufficient evidence of carcinogenicity in experimental animals.

Perchloroethylene is listed by IARC as a possible carcinogen. Perchloroethylene is classified by NTP as having limited evidence of carcinogenicity in humans or sufficient evidence of carcinogenicity in experimental animals.

Also see Section 9.

**OTHER POTENTIAL
HEALTH HAZARDS:**

The following information is required by Canadian WHMIS regulations. Irritancy is covered in Signs and Symptoms of Exposure in Section 4. There is no known human sensitization or toxicologically synergistic product associated with this material. Xylene and toluene have demonstrated experimental effects for reproductive toxicity, mutagenicity and teratogenicity. Studies indicate ethylbenzene and 1,1,1-trichloroethane are experimental teratogens.

SECTION 5 -- FIRE AND EXPLOSION HAZARD DATA**EMERGENCY RESPONSE
GUIDE NUMBER:**

27
Reference Emergency Response Guidebook (DOT 5800.5)

**FIRE AND
EXPLOSION HAZARDS:**

Vapor explosion hazard may occur indoors, outdoors or in sewers. Decomposition and combustion products may be toxic. Heated containers may rupture, explode or be thrown into the air. Vapors are heavier than air and may travel great distances to ignition source and flash back. Not sensitive to mechanical impact. Material may be sensitive to static discharge, which could result in fire or explosion.

FIRE FIGHTING PROCEDURES:

NFPA 704 Rating 0-2-0 (Health-Fire-Reactivity)
Keep storage containers cool with water spray. Positive pressure self-contained breathing apparatus (SCBA) and structural firefighters' protective clothing will provide limited protection.

EXTINGUISHING MEDIA:

Carbon dioxide, foam, dry chemical or water spray.

CONDITIONS OF FLAMMABILITY:

Heat, sparks or flame.

FLASH POINT:

105°F (40°C) SETA

AUTOIGNITION TEMPERATURE:

473°F (245°C)

FLAMMABLE LIMITS IN AIR:

LOWER: 0.7 Vol. % UPPER: 6.0 Vol. %

**HAZARDOUS COMBUSTION
PRODUCTS:**

Burning may produce carbon monoxide.

SECTION 6 -- REACTIVITY DATA**STABILITY:**

Stable under normal temperatures and pressures, and not reactive with water.

**INCOMPATIBILITY (MATERIALS AND
CONDITIONS TO AVOID):**

Acids, oxidizing agents or chlorine may cause a violent reaction. Avoid heat, sparks or flame.

HAZARDOUS POLYMERIZATION:

Not known to occur under normal temperatures and pressures.

MATERIAL SAFETY DATA SHEET FOR U.S.A. AND CANADA

**HAZARDOUS DECOMPOSITION
PRODUCTS:**

None under normal temperatures and pressures.

SECTION 7 – PREVENTIVE MEASURES**PRECAUTIONS FOR SAFE USE AND HANDLING****HANDLING
PRECAUTIONS:**

Keep away from heat, sparks or flame. Metal containers, including tank cars and trucks, should be grounded and bonded when material is transferred. Avoid contact with eyes, skin, clothing or shoes. Use in well ventilated area and avoid breathing vapor or mist.

**PERSONAL
HYGIENE:**

Use good personal hygiene. Wash thoroughly with soap and water after handling and before eating, drinking or using tobacco products. Clean contaminated clothing, shoes and protective equipment before reuse. Discard contaminated clothing, shoes or protective equipment if they cannot be thoroughly cleaned.

**SHIPPING AND
STORING
PRECAUTIONS:**

Keep container tightly closed when not in use and during transport. Do not pressurize, cut, heat, weld, grind or expose containers to flame or other sources of ignition. Empty product containers may contain product residue. See Section 9 for Packing Group information.

**SPILL
PROCEDURES:**

Remove all ignition sources. Stop leak if you can do it without risk. Wear protective equipment specified in Section 7, CONTROL MEASURES. Ventilate area and avoid breathing vapor or mist. Water spray may reduce vapor; but it may not prevent ignition in closed spaces. For large spills, isolate area and deny entry; dike far ahead of liquid spill for later disposal. Contain away from surface waters and sewers. If possible, contain as a liquid for possible re-refining or sorb with compatible sorbent material and shovel with a non-sparking tool into closable container for disposal. See Emergency Response Guidebook (DOT P 5800.5) Guide Number 27 for more information.

**WASTE DISPOSAL
METHODS:**

Dispose in accordance with federal, state, provincial and local regulations. Contact Safety-Kleen regarding recycling or proper disposal.

CONTROL MEASURES**EYE
PROTECTION:**

Where there is likelihood of eye contact, wear chemical goggles and faceshield. Do NOT wear contact lenses.

**PROTECTIVE
GLOVES:**

Use Nitrile, Viton[®] or equivalent gloves to prevent contact with skin. Do NOT use Butyl rubber, natural rubber or equivalent gloves.

**RESPIRATORY
PROTECTION:**

Use NIOSH/MSHA-approved respiratory protective equipment when concentration of vapor or mist exceeds applicable exposure limit. A self-contained breathing apparatus (SCBA) and full protective equipment is required for large spills or fire emergencies. Selection and use of respiratory protective equipment should be in accordance in the U.S.A. with OSHA General Industry Standard 29 CFR 1910.134 and in Canada with CSA Standard Z94.4-M1982.

**ENGINEERING
CONTROLS:**

Provide process enclosure or local ventilation needed to maintain concentration of vapor or mist below applicable exposure limits. Where explosive mixtures may be present, systems safe for such locations should be used.

**OTHER PROTECTIVE
EQUIPMENT:**

Where spills and splashes are possible, wear appropriate solvent-resistant boots, apron or other protective clothing. Clean water should be available in work areas for flushing the eyes and skin.

SECTION 8 – PHYSICAL DATA**PHYSICAL STATE,
APPEARANCE AND ODOR:**

Liquid, clear, green with characteristic hydrocarbon odor

ODOR THRESHOLD:

Not available

SAFETY-KLEEN 105 SOLVENT

MATERIAL SAFETY DATA SHEET FOR U.S.A. AND CANADA

SPECIFIC GRAVITY: 0.77 to 0.80 at 60/60°F (16/16°C) (water = 1)

DENSITY: 6.4 to 6.7 lbs/gal

VAPOR DENSITY: 4.9 (air = 1)

VAPOR PRESSURE: 2 mm Hg at 68°F (20°C)

BOILING POINT: 304 to 435°F (151 to 224°C)

FREEZING POINT: Not available

pH: 7 (water extraction)

VOLATILE ORGANIC COMPOUNDS: 100 WT%; 6.4 to 6.7 lbs/gal; 770 to 800 g/l
(US EPA DEFINITION)

EVAPORATION RATE: 0.1 (butyl acetate = 1)

SOLUBILITY IN WATER: Slight

COEFFICIENT OF WATER/OIL DISTRIBUTION: Not available

MOLECULAR WEIGHT: 142 (approximately)

SECTION 9 -- OTHER REGULATORY INFORMATION

TRANSPORTATION INFORMATION

DOT PROPER SHIPPING NAME: COMBUSTIBLE LIQUID, N.O.S. (Mineral Spirits)

DOT CLASS: Combustible Liquid

DOT ID NUMBER: NA1993, PGIII

TDG CLASSIFICATION: Naphtha, solvent, Class 3.3, UN1256, P.G. III

SARA TITLE III: Product contains toxic chemicals subject to the reporting requirements of Section 313 of Title III of the Superfund Amendments and Reauthorization Act of 1986 and 40 CFR Part 372. Toxic constituents are listed with an asterisk in Section 2 of this Material Safety Data Sheet.

Product poses the following physical and health hazards as defined in 40 CFR 370.3 (Sections 311, 312 of SARA Title III):

Immediate (Acute) Health Hazard
Delayed (Chronic) Health Hazard
Fire Hazard

WHMIS CLASSIFICATION: Class B3, Combustible Liquids;
Class D2A, Infectious and Toxic Materials, Other Toxic Effects, Very Toxic Material;
Class D2B, Infectious and Toxic Materials, Other Toxic Effects, Toxic Material

User assumes all risks incident to the use of this product. To the best of our knowledge, the information contained herein is accurate. However, Safety-Kleen assumes no liability whatsoever for the accuracy or completeness of the information contained herein. No representations or warranties, either expressed or implied, or merchantability, fitness for a particular purpose or of any other nature are made hereunder with respect to information or the product to which information refers. The data contained on this sheet apply to the material as supplied to the user.

SECTION I**ASBESTOS****COURSE
OBJECTIVE**

The Objective of this course is to inform secondary level students of health and safety issues related to servicing today's vehicles, the regulations which affect the Automotive Service Industry, opportunities for preventing pollution and best management practices.

**SECTIONAL
OBJECTIVE**

Given a information sheet and learning activities you will learn about Asbestos. Your performance will be evaluated by the number of correct answers you achieve on the post test. A minimum score of 80% is required to successfully complete this course.

**ENABLING
OBJECTIVE**

1. Identify what Asbestos is.
2. Identify how you can be exposed to it.
3. Determine proper servicing techniques to avoid exposure.

Choose the one correct answer.

- ATEAM CURRICULUM GUIDE • SECTION I • 2 OF 8

SECTION I**ASBESTOS****INFORMATION
SHEET****I-1****I-2****I-3****Health and Safety Issues:**

Friction materials, such as brake linings and clutch facings often contain asbestos. Millions of asbestos fibers can be released into the air during brake and clutch servicing. Grinding and beveling asbestos products can cause even higher level of exposures.

Like germs, asbestos fibers are small enough to be invisible and can remain and accumulate in the lungs. When you see a dust cloud forming during the servicing of a brake assembly, you are seeing clumps containing thousands of fibers.

Asbestos released into the air lingers around a service shop long after a brake job is done. Asbestos can also get in a technician's hand and be swallowed when eating or smoking a cigarette.

Asbestos exposure can cause scar tissue to form in the lungs. This is a very gradual process that usually takes many years before its effects are noticed. The medical term for this condition is Asbestosis.

Lung cancer is currently responsible for the largest number of deaths from exposure to asbestos. People who smoke and are exposed to asbestos are at an even greater risk of contracting lung cancer.

Regulatory Issues:

It is illegal to throw a container of asbestos dust generated from the servicing of automotive brakes into the solid waste trash stream.

The generator must transport the asbestos to a special landfill that has a permit to receive asbestos.

The asbestos must be wetted down to control dust and doubled bagged prior to transport.

SECTION I**ASBESTOS****INFORMATION
SHEET****Pollution Prevention Opportunities:**

Enclosure equipment for brake cleaning, which slips easily over the brake assembly and forms a tight seal against the backing plate is available. Clear plastic walls or windows allow visibility of the work being done. Brake dust is sucked into a vacuum cleaner equipped with a special filter called an HEPA or "high efficiency particulate air" filter.

Another solution is to use a "wet sink" during the servicing of the brakes. This sink rolls up to the axle you are working on and has a wet solvent brush that allows the technician to wet brush the asbestos dust into a sink that has a drum under it to collect the solvent. The solvent is then serviced by a company licensed to transport hazardous waste.

Best Management Practices:

1. Never use compressed air to clean off brake pad linings or backing plates.
2. Never grind brake shoes or pads.
3. Never eat, drink, or smoke in an area where brake work is being performed.
4. Always wear an OSHA approved respirator when performing brake work or using a brake lathe.
5. Always assume the vehicle you are working on contains asbestos type friction materials.
6. Always use containment equipment when servicing brake assemblies.

SECTION I

ASBESTOS

LEARNING ACTIVITIES

A. ASBESTOS MANAGEMENT

1. Form the class into teams of no more than four.
2. Ask each team to answer the following questions and be prepared to share the answers with the class.
 - A. Why is asbestos harmful?
 - B. If someone has confirmed asbestos, will their lungs ever return to their normal healthy condition?
 - C. Why must we not blow out drums or brake shoes?
 - D. What should you do after performing brake work?
 - E. What two ways can we capture asbestos dust before servicing?
 - F. What type of safety equipment should the technician wear while servicing brakes?

SECTION I

ASBESTOS

LEARNING ACTIVITIES

B. ASBESTOS IN THE BLOOD STREAM DEMONSTRATION.

Supplies:

- 2 Clear jars
- 2 long thin 3/8" pieces of clear plastic tubing
- Steel wool (fine)
- Glue
- Filter material (Coffee filter, or automotive mask filter)
- 2 quarts of water
- Red food coloring

1. Label both jars - YOUR LUNGS
2. Place spots of fresh glue in each jar.
3. Open the top and place steel wool in one jar and shake.
4. Open the second jar and secure filter material around the opening with a rubber band.
5. Place the steel wool on top of jar and shake.
6. Show the students how no steel wool got into the jar with the filter on it. The jars are a representation of your lungs with and without asbestos protection measures.
7. Take one clear plastic tubing and run one quart of colored water through it. Clock the amount of time it takes for the quart to pass through the tube.
8. The tube represents the arteries and blood vessels in the human body.
9. Take some steel wool and place it in the second tube. Now run the second quart of water through it. Clock the amount of time it takes for the quart to pass through the tube.
10. Ask "Why is it so important to handle all work that involves asbestos carefully?"

SECTION I

ASBESTOS

POST TEST

Choose the one correct answer.

1. How many asbestos fibers can be released into the air during brake or clutch servicing?
 - A) Several
 - B) Hundreds
 - C) Thousands
 - D) Millions
2. Long term asbestos exposure can cause scarring of the:
 - A) Brain
 - B) Stomach
 - C) Lungs
 - D) Kidneys
3. A container of asbestos dust must be disposed of by:
 - A) Putting it in the trash.
 - B) Storing in a drum.
 - C) Transporting it to a special landfill
 - D) Burning it.
4. When performing brake service the technician must always:
 - A) Blow off brake pads/shoes with a air gun.
 - B) Use a OSHA approved respirator.
 - C) Wash hands after eating lunch.
 - D) Discard spent asbestos solvent down the drain.
5. The "Wet Sink" and "Vacuum Chamber" are tools used to:
 - A) Speed up brake service production.
 - B) Clean greasy brake hardware.
 - C) Assist in brake bleeding.
 - D) Contain and collect asbestos fibers during servicing.

SECTION I

ASBESTOS

**PRE- AND
POST- TEST
ANSWER KEY**

1. D
2. C
3. C
4. B
5. D

**INFORMATION
RESOURCES**

For further information contact:

Department of Environmental Protection Asbestos Coordinator in the Air
Quality Program at 617-292-5630.

MATERIAL SAFETY DATA SHEET

1

Part Number: _____ Trade Name: Organic Brake Lining

The following data may be used to comply OSHA's Hazard Communication Standard 29 CFR 1910.1200. The OSHA Standard must, however, be consulted for specific requirements.

SECTION I

Manufacturer's Name: HOSEI BRAKE INDUSTRIES, INC

Address: 10.Michigami, Kazue-cho, Toyota, Aichi, 470-12, Japan

Emergency Telephone Number: 0565-21-1211

Date prepared: November 6, 1990

Preparer: T. Shinpo

SECTION II - HAZARDOUS INGREDIENTS/IDENTITY INFORMATION

Chemical Name	OSHA PEL	ACGIH TLV	%
Asbestos(Chrysotile)	0.2fibers/c.c.	2fibers/c.c.	59
Phenolic Resins	--	--	14
Cashew Dust	--	--	59
Others	--	--	10

SECTION III - PHYSICAL/CHEMICAL CHARACTERISTICS

Boiling Point	: NA	Specific gravity(water=1):	1.7
Vapor Pressure(mm Hg.):	NA	Melting Point	: NA
Vapor Density(Air=1)	: NA	Evaporation Rate	: None
Solubility in Water	: Negligible		
Appearance and Odor	: Slid, Odorless, Dark Gray Color		

SECTION IV - FIRE AND EXPLOSION HAZARD DATA

Flash Point: NA	Flammable Limits	LEL: NA	UEL: NA
Extinguishing Media: Water	Fog or Foam		

Special Fire Fighting Procedures: NA

Unusual Fire and Explosion Hazards: NA

SECTION V - REACTIVITY DATA

Stability: Unstable-
Stable -

Conditions to Avoid: None Known

Incompatibility(Materials to Avoid): None Known

Hazardous Decomposition or Byproducts:

Incomplete combustion will create carbon monoxide and carbon dioxide.

Hazardous may Occur -
Polymerization: Will Not Occur-

Conditions to Avoid: None Known

SECTION VI - SPILL OR LEAK PROCEDURES

Steps to be taken in case material is released or spilled:

Refer to "Recommended Procedures" on Page 4.

Waste Disposal Method:

Dispose of in proper receptacles appropriately labelled in accordance with applicable federal, state and laws and regulations.

SECTION VII - HEALTH HAZARD DATA

Route(s) of Exposure: Inhalation? Yes Skin? Yes Ingestion? Yes

Health Hazard (Acute and Chronic):

Some persons may be sensitive to partially cured phenolic resins and develop dermatitis-type reactions. Metal dusts can be irritants of the eyes and upper respiratory system. there is little known evidence of chronic industrial poisoning from iron dusts.

Inhalation of concentrations of airborne asbestos fibers in excess of the OSHA limits may be hazardous to health and may cause serious badlly harm such as asbestosis lung cancer or mesothelioma. These diseases may not be recognized until many years after exposure. Medical literature indicates that people who smoke are at a significantly increased health risk when working with airborne asbestos fibers.

Carcinogenicity: NTP? Yes IARC? Yes OSHA? Yes

Signs and Symptoms of Exposure:

Partially cured Phenolic resins and Cashew Dusts: skin eruptions similar in appearance to poison Ivy. Lung effects: coughing, wheezling, shortness of breath, impaired pulmonary function. Dust in eye may cause irritation. G
Gastrointestinal disturbances possible from ingestion.

SECTION VIII - FIRST AID AND PROCEDURES

Should not be necessary from the handling of this product.

SECTION IX - PROTECTION INFORMATION

Personal Protective Equipment for:

Eye- Safety Glasses

Skin- Protective Gloves

Other-

See paragraph 7 of "Recommended Procedure" on Page 4.

Ventilation: Local Exhaust- Yes
Mechanical(General)- NA

Special-
Other-

Other Information: NA

SECTION X - SPECIAL PRECAUTIONS

The Friction Material product, as shipped, is not considered hazardous, but machining(grinding and drilling) and/or normal use may create asbestos dust or airborne asbestos fibers in excess of OSHA standard and should be considered hazardous. Removal of used Brake Shoes is considered hazardous.

SEE REVERSE SIDE FOR FRICTION MATERIALS STANDARDS INSTITUTE'S RECOMMENDED PROCEDURES FOR REDUCING ASBESTOS DUST DURING BRAKE SERVICING.

Recommended Precaution - If airborne asbestos fiber concentrations exceed OSHA limits, NIOSH approved respirators should be worn and proper engineering controls implemented. If product is ground or machined, local exhaust to control exposure to airborne asbestos fiber or dust is recommended. (See "Recommended Procedures" on Page 4.)

The work environment should be monitored to determine whether employee exposure exceed OSHA permissible exposure level in accordance with OSHA regulation 29 CFR Part 1910.1001.

Packages containing the Friction Material Product should be labelled in accordance with OSHA regulation 29 CFR Part 1910.1001 as follows:

DANGER
CONTAINS ASBESTOS FIBERS
AVOID CREATING DUST
CANCER AND LUNG DISEASE HAZARD

Standard industrial hygiene practices, including good housekeeping and vacuuming or wet cleaning work surfaces to prevent asbestos fibers or dust from becoming airborne, should be instituted or implemented and maintained.

SECTION J

USED TIRES

COURSE OBJECTIVE

The Objective of this course is to inform secondary level students of health and safety issues related to servicing today's vehicles, the regulations which affect the Automotive Service Industry, opportunities for preventing pollution and best management practices.

SECTIONAL OBJECTIVE

Given a information sheet and learning activities you will learn about hazards associated with Used Tires. Your performance will be evaluated by the number of correct answers you achieve on the post test. A minimum score of 80% is required to successfully complete this course.

ENABLING OBJECTIVE

1. Explain the hazards of stockpiling used tires.
2. Identify the DEP regulations regarding used tire disposal.
3. Discuss the recycling opportunities that are available for used tires.

SECTION J

USED TIRES

**PRE-TEST
QUESTIONS**

Choose the one correct answer:

1. Whole tires that are stockpiled are a serious:

A) Fire hazard	B) Health hazard
C) Eyesore	D) All three A, B and C.

2. The disposal of whole tires in Massachusetts landfills was banned in:

A) 1991	B) 1994
C) 1984	D) 1981

3. Landfills will accept tires that have been:

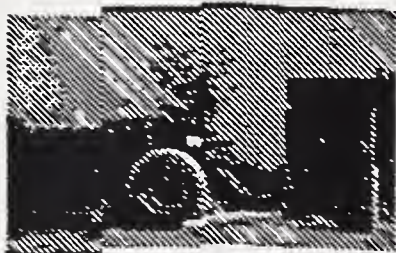
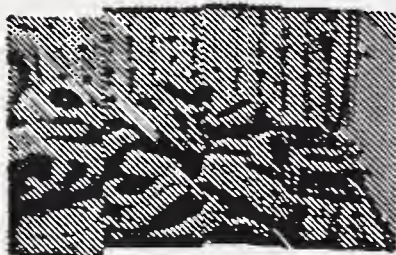
A) Stacked neatly	B) Quartered
C) Shredded	D) Both B and C

4. Operations that are exempt from obtaining a site assignment permit are:

A) Tire dealers	B) Tire recyclers
C) Tire recappers	D) Both B and C

5. Alternative ways in which tires can be recycled are:

A) As floor mats	B) As rubberized asphalt.
C) As a fuel.	D) All three A, B, and C.

SECTION J**USED TIRES****INFORMATION
SHEET****J-1****J-2****J-3****Health and Safety Issues:**

Tires represent a significant volume of waste. If whole tires are stockpiled in large quantities, they become a serious fire and health hazard. Tires which were buried whole in landfills years ago may rise to the surface due to natural vibration.

Regulatory Issues:

As of December 31, 1991 the disposal of whole tires in Massachusetts landfills was banned. However, shredded tires, or "quartered" tires, are acceptable in landfills. If burned in a solid waste incinerator, the tires may be shredded or whole. Companies that are in the business of waste tire disposal are required to obtain a site assignment from their local board of health and permit under Massachusetts Solid Waste regulations.

Operations which are exempt from site assignment are tire recapping operations and tire recycling facilities which receive less than 100 tons per day, provide a completely enclosed operation and do not allow tires to accumulate on speculation(more than 90 days).

DEP does not regulate either the point of generation or the transportation of tires.

Pollution Prevention Opportunities:

A number of new technologies for reuse and recycling of used tires have been tried. Engineers have been able to separate the scrap steel and produce a mealy rubber that can be added to asphalt for use on roads. Another technology, a catalytic reduction process, bakes chipped tires which bleeds away the carbon black and recovers the hydrocarbons as methane gas and as fuel oil.

DEP will be developing markets for recycled tires and tire products.

Best Management Practice:

Every automotive service facility should be prepared to accept old tires from customers and have arrangements with a removal contractor and chipping facility which will process the tires for use as a fuel or feedstock for a recycled product such as rubberized asphalt.

SECTION J

USED TIRES

LEARNING ACTIVITY

A. "WHAT GOES AROUND COMES AROUND"

1. Break the class up into teams of no more than four students.
2. Have each team complete the following exercises then ask each team to present its findings:

Part A

Small Town USA has 100,000 registered vehicles. 1/3 of these vehicles will require 2 tires per year. How many tires will this town replace in one year?

ANSWER - $333,333 \times 2 = 666,666$! Over a half a million!

Part B

The average weight of a tire is 22 pounds. How much will Small Town's used tires weigh in one year?

ANSWER - $666,666 \times 22 = 14,666,652$ lbs. or 7,333 tons !

How can we better manage this large waste problem?

Part C

Ask each team to list the different recycling possibilities for used tires.

Examples:

Sandal shoes	Hard top filler	Roofing material
Fuel for generators	Play ground equipment	Gasket material
Blasting mats	Guard rail barriers	Boat/Dock cushions

SECTION J

USED TIRES

POST-TEST

Choose the one correct answer:

1. Whole tires that are stockpiled are a serious:

A) Fire hazard	B) Health hazard
C) Eyesore	D) All three A, B and C.

2. The disposal of whole tires in Massachusetts landfills was banned in:

A) 1991	B) 1994
C) 1984	D) 1981

3. Landfills will accept tires that have been:

A) Stacked neatly	B) Quartered
C) Shredded	D) Both B and C

4. Operations that are exempt from obtaining a site assignment permit are:

A) Tire dealers	B) Tire recyclers
C) Tire recappers	D) Both B and C

5. Alternative ways in which tires can be recycled are:

A) As floor mats.	B) As rubberized asphalt.
C) As a fuel	D) All three A, B, and C.

SECTION J**USED TIRES****PRE- AND
POST- TEST
ANSWER KEY**

1. D
2. A
3. D
4. D
5. D

**INFORMATION
RESOURCES**

For further information contact:

Department of Environmental Protection Solid Waste Management Program
(617-292-5960)

SECTION K**USED BATTERIES****COURSE
OBJECTIVE**

The Objective of this course is to inform secondary level students of health and safety issues related to servicing today's vehicles, the regulations which affect the Automotive Service Industry, opportunities for preventing pollution and best management practices.

**SECTIONAL
OBJECTIVE**

Given a information sheet and learning activities you will learn about Used Batteries. Your performance will be evaluated by the number of correct answers you achieve on the post test. A minimum score of 80% is required to successfully complete this course.

**ENABLING
OBJECTIVE**

1. Determine the disposal regulation for used batteries.
2. Identify when used batteries become a hazardous waste.
3. Identify how to recycle spent batteries.

SECTION K

USED BATTERIES

PRE-TEST

Choose the one correct answer:

1. Batteries contain acid which when in contact with other surfaces will cause:

A) A fire	B) A stain
C) Corrosion	D) Water reaction

2. Lead acid batteries were banned from landfilling or incineration in Massachusetts in:

A) 1985	B) 1993
C) 1988	D) 1990

3. Non-leaking automotive batteries are regulated as a hazardous waste.

A) True	B) False
C) Both A and B	D) Neither A or B

4. If a battery is open or leaking:

A) It should be disposed of in the trash.	B) It should be sent to a recycler.
C) The acid must be collected/managed as a hazardous waste.	D) Stored on a wooden pallet.

5. All spent batteries should be stored:

A) In stacks against a wall.	B) Outside on the ground.
C) On a pallet, under cover, with strapping to prevent spills.	D) Under the work bench.

SECTION K**USED BATTERIES****INFORMATION
SHEET****K-1****Health and Safety Issues:**

Handling automotive batteries demands certain precautions. If batteries are leaking, or are severely corroded, the acid can cause skin burns. All stored batteries should be protected against weather and damage.

Regulatory Issues:

Lead acid batteries were banned from landfilling or incineration in Massachusetts, as of December 31, 1990.

Non-leaking automotive batteries are not regulated as a hazardous waste but should be recycled. If the battery is open or leaking, the acid must be collected and managed as a hazardous waste. The carcass is not regulated if it is sent for recycling. Batteries being reclaimed are exempt from hazardous waste regulation until they are stored by the reclaimer.

Pollution Prevention Opportunities:

Keeping batteries out of our solid waste landfills and incinerators is a significant method of reducing pollution.

Every automotive servicing facility can assist by taking back the customer's spent battery upon the purchase of a new battery. Because of the current value of lead, it should be easy to recover cost when the battery is sent to a reclaimer.

Best Management Practice:

- Store all spent batteries on a pallet, under cover, with strapping to prevent spillage. Your battery distributor may have a plan for removing your old batteries in bulk.

SECTION K

USED BATTERIES

LEARNING ACTIVITY

A. "BATTERY BASICS"

1. Break the class up into teams of no more than four students.
2. Have each team complete the following exercises then ask each team to present its findings:

Part A

Small Town USA has 100,000 registered vehicles. 25% of these vehicles will require a battery replacement in one year. How many batteries will be replaced in one year?

ANSWER - 25,000 batteries

Part B

The average battery weighs 18 pounds. What will the total weight of the used batteries be in one year?

ANSWER - 450,000 pounds or 225 tons !

Part C

How can we best manage this large waste problem?

SECTION K

USED BATTERIES

POST TEST

Choose the one correct answer:

1. Batteries contain acid which when in contact with other surfaces will cause:

A) A fire	B) A stain
C) Corrosion	D) Water reaction

2. Lead acid batteries were banned from landfilling or incineration in Massachusetts in:

A) 1985	B) 1993
C) 1988	D) 1990

3. Non-leaking automotive batteries are regulated as a hazardous waste.

A) True	B) False
C) Both A and B	D) Neither A or B

4. If a battery is open or leaking:

A) It should be disposed of in the trash.	B) It should be sent to a recycler.
C) The acid must be collected/managed as a hazardous waste.	D) Stored on a wooden pallet.

5. All spent batteries should be stored:

A) In stacks against a wall.	B) Outside on the ground.
C) On a pallet, under cover, with strapping to prevent spills.	D) Under the work bench.

SECTION K**USED BATTERIES****PRE- AND
POST- TEST
ANSWER KEY**

1. C
2. D
3. B
4. C
5. C

**INFORMATION
RESOURCES**

For additional information:

Contact the Department of Environmental Protection Compliance Assistance
line (617-292-5898)

Scholle

Corporation / 200 West North Avenue, Northlake, IL 60164/Tel. (708) 562-7290

EMERGENCY TELEPHONE

CHEMTREC: 1-800-424-9300

Sept. 1990

PLANTS: Northlake, IL (708) 562-7290 / Rancho Dominguez (Compton, CA) (213) 537-1800 / Atlanta, GA (404) 781-3134 / Dallas, TX (214) 278-9545

Material Safety Data Sheet

Electrolyte
Battery Acid

This Material Safety Data Information Sheet is principally directed to managerial, safety, hygiene and medical personnel. The description of physical, chemical and toxicological properties and handling advice is based on experimental results and past experience. It is intended as a starting point for the development of health and safety procedures.

DOT LABELING
REQUIREMENTS:

Shipping Name: Sulfuric acid
Class: Corrosive material
UN No.: UN2796

HAZARDOUS
INGREDIENTS/IDENTITY:

	OSHA PEL	ACGIH TLV	CAS NUMBER	WEIGHT %
Sulfuric Acid - 66° Baume (Mineral Acid, Oil of Vitriol, H ₂ SO ₄ , sulphuric acid)	1mg/M ³	1mg/M ³	7664-93-9	34-36
Water				64-66

40 CFR Part 372.45

Notification:

Concentrated sulfuric acid contains approximately 35% by weight of H₂SO₄ by weight (Cas No. 7664-93-9) and is subject to the reporting requirements of section 313 of Title III of the superfund amendments and authorization act of 1986. It is also subject to the reporting requirements of 40 CFR part 372.

PHYSICAL & CHEMICAL
CHARACTERISTICS:

Formula: H₂SO₄
Formula Weight: 98.08
Physical State/Description: Clear, colorless liquid.
Boiling Point: 35% = 275°F approx.
Flash Point: Not applicable
Freezing Point: 35% = -80°F (-62°C) approx.
Odor: None
pH: Less than 1 (1% aqueous solution)
Specific Gravity: 35% = 1.265 (water = 1)
Vapor Density: 3.4 (air = 1 at boiling point of sulfuric acid)
Vapor Pressure: 35% = Less than 1 mmHg at 100°F (37.8°C)
Water Solubility: Soluble in all proportions.
Reportable Quantity: 1,000 lb./454 kg. as H₂SO₄

Scholle Corporation

1200 West North Avenue, Northlake, IL 60164/Tel. (708) 562-7290

Emergency Telephone
Chemtrec (800) 429-9300
Sept. 1990

Electrolyte Battery Acid

FIRE & EXPLOSION DATA:

Flash Point: N/A
Auto-Ignition Temperature: N/A
Extinguisher Media: Dry chemical or CO₂ small fires. Water fog, large fires.
Special Fire Fighting Procedures: Do not direct water into acid tanks. Cool outside of tank with water. Wear full-face, self-contained respirator, rubberized outer wear, gloves, boots.
Unusual Fire and Explosion Hazards: Sulfuric acid will not burn but can start fires with organic material, nitrates, carbides, chlorates and metal powders. Flammable hydrogen gas can form when acid contacts most metals. Hydrogen may accumulate in containers, avoid ignition sources, spill over into sewers may generate hydrogen gas or toxic sulfides. Addition of water to acid causes heat and possible splattering.

PHYSICAL HAZARDS: (REACTIVITY DATA)

Stability: Stable
Conditions to Avoid: Contact with metals, organics.
Incompatibility: (Materials to Avoid) Strong corrosive agent will attack most metals. Contact with organics, nitrates, carbides, chlorates, etc. may cause ignition. Allyl compounds and aldehydes undergo polymerization — possibly violent.
Hazardous Decomposition Products: Sulfur oxides at high temperature. Reacts with above to form hydrogen cyanide and hydrogen sulfide.
Hazardous Polymerization: Will Not Occur
Conditions to Avoid: All contact with organic substances and most metals.

HEALTH HAZARDS:

Acute: 3rd degree burns. Severe respiratory, skin and eye irritant. Bronchitis Laryngeal and pulmonary edema may result.
Signs and Symptoms of Exposure: Prickling or burning sensation of skin and mucous membranes. Coughing, sneezing, tightness of chest, difficulty in breathing.
Medical Conditions Generally Aggravated by Exposure: Any pre-existing respiratory disease, for example emphysema.

Scholle Corporation

1200 West North Avenue, Northlake, IL 60164/Tel. (708) 562-7290

Emergency Telephone
Chemtrec (800) 429-9300

Sept. 1990

Electrolyte Battery Acid

HEALTH HAZARDS (continued):

Chemical Listed as
Carcinogen or
Potential Carcinogen:

National Toxicology
Program:

No

I.A.R.C.

Monographs:

No

OSHA:

No

CAL/OSHA:

No

Prop65:

No

Emergency and

First Aid Procedures:

Speed in removing acid is essential. Treat most urgent symptoms first: cessation of breathing, eye injury, skin contact, shock. Seek medical assistance even if injury appears slight. Give physician detailed account of incident.

RECOMMENDATIONS TO PHYSICIAN:

While the patient is being transported to a medical facility, apply compresses of iced water. If medical treatment must be delayed, immerse the affected area in iced water. If immersion is not practical, compresses of iced water can be applied. Avoid freezing tissues.

Note to Physician:

Continued washing of the affected area with cold or iced water will be helpful in removing the last traces of sulfuric acid. Creams or ointments should not be applied before or during the washing phase of the treatment.

ROUTES OF ENTRY:

Inhalation:

Remove from exposure. CPR, if indicated. Give oxygen.

Eyes:

Flush immediately with large amounts of water for at least 15 minutes. Hold eyelids open during flushing.

Skin:

Flush immediately with large amounts of water. Remove contaminated clothing and shoes (this can be done while under shower).

Ingestion:

Do not induce vomiting. Give large amounts of milk, milk of magnesia or table oil or fresh eggs. Use water when nothing else is available. Rinse mouth often.

Conditions

Aggravated by:

Individuals with preexisting disease of the lungs may have increased susceptibility to the toxicity of excessive exposures.

Scholle Corporation

1200 West North Avenue, Northlake, IL 60164/Tel. (708) 562-7290

Emergency Telephone
Chemtrec (800) 429-9300
Sept. 1990

Electrolyte Battery Acid

SPECIAL PRECAUTIONS AND SPILL/LEAK PROCEDURES:

Precautions to
be Taken in

Handling and Storage: See "Unusual Fire and Explosion Hazards." Do not store near organics. Hydrogen may be generated inside drums and tanks; avoid flames and sparks.

Other Precautions: Never add water to containers of acid. For spills, beware of acid reaction in sewers that may produce flammable hydrogen gas or toxic sulfides.

Steps to be Taken in
Case Material is
Released or Spilled:

Wear full acid-protective gear. Remove sources of ignition. Neutralize spill with lime or soda ash. Flush to waste water treatment system. Dike large spills. Do not wash into storm or sanitary sewer system.

Waste Disposal
Methods (Consult
Federal, State and
Local Regulations):

Flush as above. Neutralize with lime or soda ash. (a minimum of 5.2 pounds soda ash per gallon of electrolyte). Consult regulations.
EPA hazardous waste D0002 - corrosive and D0003 - reactive if discarded.

SPECIAL PROTECTION INFORMATION/CONTROL MEASURES:

Respiratory Protection: When needed use NIOSH or MSHA approved half or full-face mask with acid gas cartridge. For high concentrations, use self-contained breathing unit.

Ventilation: Required

Local Exhaust: Yes

Mechanical: Ventilate storage tanks before entry.

Protective Gloves: Rubber

Eye Protection: Chemical goggles or full-face shield.

Other Protective
Clothing or
Equipment:

Rubber safety shoes/boots. Rubber apron or full suit if splashes likely.

Work/Hygienic
Practices:

Prohibit smoking. Provide safety showers/eye washes near work site. Train employees in chemical handling practices.

Maintenance of
Contaminated
Equipment:

Use same precautions as in "Special Precautions" above.

Labeling Priority:

Corrosive

MATERIAL SAFETY DATA SHEET

Date Issued 5/91

Page 1 of 6

I. PRODUCT IDENTIFICATIONChemical/Trade Name (as used on label)

Lead-Acid Battery

Chemical Family/Classification

Electric Storage Battery

Manufacturer's Name/AddressExide Corporation
645 Penn Street
Reading, PA 19601TelephoneFor information and emergencies,
contact Environmental Resources
Dept. (215) 378-0757.24-hour Emergency Contact:
CHEMTREC (800) 424-9300
(Only in the event of chemical
emergencies involving a spill, -
leak, fire, exposure, or
accident involving chemicals).II. HAZARDOUS INGREDIENTS/IDENTITY INFORMATION

<u>Components</u>	<u>CAS Number</u>	<u>% by Wt. or Vol.</u>	<u>Air Exposure Limits (ug/m³)</u>		
			<u>OSHA</u>	<u>ACGIH</u>	<u>NIOSH</u>
Inorganic lead compound:					
Lead	7439-92-1	60	50	150	100
Antimony	7440-36-0	2	500	500	--
Arsenic	7440-38-2	0.2	10	20	--
Calcium	7440-70-2	0.2	--	--	--
Tin	7440-31-5	0.2	2000	2000	--
Electrolyte (sulfuric acid)	7664-93-9	10-30	1000	1000	1000
Case Material:		5-10	N/A	N/A	N/A
Polypropylene	9003-07-0				
Polystyrene	9003-53-6				
Styrene					
Acrylonitrile	9003-54-7				
Acrylonitrile					
Butadiene Styrene	9003-56-9				
Styrene Butadiene	9003-55-8				
Polyvinylchloride	9002-86-2				
Polycarbonate	--				
Hard Rubber	--				
Other:					
Silicon dioxide (gel cell bat- teries only)	60676-86-0	10	N/A	N/A	N/A

II. HAZARDOUS INGREDIENTS/IDENTITY INFORMATION (Continued)

Components	CAS Number	% by Wt. or Vol.	Exposure Limits ug/m ³		
			OSHA	ACGIH	NIOSH
Other:					
Sheet Molding Compound (glass - reinforced polyester)	--	10	N/A	N/A	N/A

NOTE: Inorganic lead and electrolyte (sulfuric acid) are the primary components of every battery manufactured by Exide Corporation or its subsidiaries. Other ingredients may be present dependent upon battery type. Polypropylene is the principal case material of automotive and commercial batteries; other case material may apply to varieties of industrial batteries.

III. PHYSICAL DATA**Electrolyte:**

<u>Boiling Point:</u>	203°F	<u>Specific Gravity (H₂O=1):</u>	1.230 to 1.350
<u>Melting Point:</u>	Not Applicable	<u>Vapor Pressure (mm Hg):</u>	10
<u>Solubility in Water:</u>	100%	<u>Vapor Density (AIR=1):</u>	Greater Than :
<u>Evaporation Rate</u> (Butyl acetate=1)	Less Than 1	<u>% Volatiles by Weight:</u>	Not Applicable
<u>Appearance and Odor:</u>	Manufactured article; no apparent odor. Electrolyte is a clear liquid with a sharp, penetrating, pungent odor.		

IV. FIRE AND EXPLOSION HAZARD DATA

Flash Point: Not Applicable Flammable Limits: LEL = 4.1% (Hydrogen Gas) UEL = 74.2%

Extinguishing media: CO₂; foam; dry chemical; halogen

Special Fire Fighting Procedures: If batteries are on charge, shut off power. Use positive pressure, self-contained breathing apparatus. Water applied to electrolyte generates heat and causes it to spatter. Wear acid-resistant clothing.

Unusual Fire and Explosion hazards: Highly flammable hydrogen gas is generated during charging and operation of batteries. To avoid risk of fire or explosion, keep sparks or other sources of ignition away from batteries. Do not allow metallic materials to simultaneously contact negative and positive terminals of cells and batteries. Follow manufacturer's instructions for installation and service.

V. REACTIVITY DATA

Stability: Stable X Conditions to Avoid: Prolonged overcharge; sources of ignition.
 Unstable

Incompatibility: (materials to avoid)

Contact of sulfuric acid with combustibles and organic materials may cause fire and explosion. Also reacts violently with strong reducing agents, metals, sulfur trioxide gas, strong oxidizers and water. Contact with metals may produce toxic sulfur dioxide fumes and may release flammable hydrogen gas.

V. REACTIVITY DATA (Continued)

Incompatibility: (materials to avoid) (Continued)

Avoid contact of lead compounds with strong acids, bases, halides, halogenates, potassium nitrate, permanganate, peroxides, nascent hydrogen and reducing agents.

Hazardous Decomposition Products:

Sulfuric acid: Sulfur trioxide, carbon monoxide, sulfuric acid mist, sulfur dioxide, hydrogen.

Lead compounds: High temperatures likely to produce toxic metal fume, vapor or dust; contact with strong acid or base or presence of nascent hydrogen may generate highly toxic arsine gas.

VI. HEALTH HAZARD DATA

Routes of Entry: Sulfuric acid is harmful by all routes of entry. Hazardous exposure to lead compounds can occur only when product is heated, oxidized or otherwise processed or damaged to create dust, vapor or fume.

Inhalation: Breathing of sulfuric acid vapors or mists may cause severe respiratory irritation. Inhalation of lead dust or fumes may cause irritation of upper respiratory tract and lungs.

Ingestion:

Sulfuric acid: May cause severe irritation of mouth, throat, esophagus and stomach.

Lead compounds: Acute ingestion may cause abdominal pain, nausea, vomiting, diarrhea and severe cramping. This may lead rapidly to systemic toxicity and should be treated by a physician.

Skin Contact

Sulfuric acid: Severe irritation, burns and ulceration.

Lead compounds: Not absorbed through the skin.

Eye Contact:

Sulfuric acid: Severe irritation, burns, cornea damage, blindness.

Lead compounds: May cause eye irritation.

Effects of Overexposure - Acute:

Sulfuric acid: Severe skin irritation, damage to cornea, upper respiratory irritation.

Lead compounds: Symptoms of toxicity include headache, fatigue, abdominal pain, loss of appetite, muscular aches and weakness, sleep disturbances and irritability.

II. HEALTH HAZARD DATA (Continued)

Effects of Overexposure - Chronic:

Sulfuric acid: Possible erosion of tooth enamel; inflammation of nose, throat and bronchial tubes.

Lead compounds: Anemia, neuropathy, particularly of the motor nerves, with wrist drop, kidney damage, reproductive changes in both males and females.

Carcinogenicity:

Lead is listed as a 2B carcinogen, likely in animals at extreme doses. Proof of carcinogenicity in humans is lacking at present. Arsenic is listed as a carcinogen by National Toxicology Program (NTP), International Agency for Research on Cancer (IARC), OSHA and NIOSH with prolonged exposure at high levels only.

Medical Conditions Generally Aggravated by Exposure:

Overexposure to sulfuric acid mist may cause lung damage and aggravate pulmonary conditions. Contact of sulfuric acid with skin may aggravate skin diseases such as eczema and contact dermatitis. Lead and its compounds can aggravate some forms of kidney, liver and neurologic diseases.

Emergency and First Aid Procedures:

Inhalation:

Lead - Remove from exposure, gargle, wash nose and lips; consult physician.

Sulfuric acid - Remove to fresh air immediately. If breathing is difficult, give oxygen.

Ingestion:

Lead - Consult physician.

Sulfuric acid - Give large quantities of water; do not induce vomiting; consult physician.

Skin: Flush with large amounts of water for at least 15 minutes; remove contaminated clothing completely, including shoes.

Eyes: Flush immediately with water for at least 15 minutes; consult physician.

III. PRECAUTIONS FOR SAFE HANDLING AND USE

Spill or Leak Procedures:

Stop flow of material, contain/absorb small spills with dry sand, earth, vermiculite. Do not use combustible materials. If possible, carefully neutralize with soda ash, sodium bicarbonate, lime, etc. Wear acid-resistant clothing, boots, gloves, and face shield. Do not allow discharge of unneutralized acid to sewer.

VII. PRECAUTIONS FOR SAFE HANDLING AND USE (Continued)

Waste Disposal Methods:

Place neutralized slurry into sealed containers and dispose of as hazardous waste, as applicable. Large, water-diluted spills, after neutralization and testing, should be managed in accordance with approved local, state and federal requirements. Consult state environmental agency.

Spent batteries: Send to secondary lead smelter for recycling.

Handling and Storage:

Store in cool, dry, well-ventilated areas with impervious surfaces and adequate containment in the event of spills. Batteries should also be stored under roof for protection against adverse weather conditions. Separate from incompatible materials. Store and handle only in areas with adequate water supply and spill control. Avoid damage to containers. Keep away from fire, sparks and heat.

Precautionary Labelling:

POISON - CAUSES SEVERE BURNS

DANGER - CONTAINS SULFURIC ACID

VIII. CONTROL MEASURES

Engineering Controls:

Store and handle in well-ventilated area. If mechanical ventilation is used components must be acid-resistant.

Work Practices:

Handle batteries cautiously to avoid spills. Make certain vent caps are on securely. Avoid contact with internal components.

Respiratory Protection:

None required under normal conditions. When concentrations of sulfuric acid mist are known to exceed PEL, use NIOSH or MSHA-approved respiratory protection.

Protective gloves:

Rubber or plastic acid-resistant gloves with elbow-length gauntlet.

Eye Protection:

Chemical goggles or face shield.

Other Protection:

Acid-resistant apron. Under severe exposure or emergency conditions, wear acid-resistant clothing and boots.

II. CONTROL MEASURES (Continued)

Emergency Flushing:

In areas where sulfuric acid is handled in concentrations greater than 1%, emergency eyewash stations and showers should be provided, with unlimited water supply.

OTHER REGULATORY INFORMATION

NFPA Hazard Rating for sulfuric acid:

Flammability (Red) = 0

Health (Blue) = 3

Reactivity (Yellow) = 2

Sulfuric acid is water-reactive if concentrated.

U.S. DOT: Wet (filled with electrolyte) batteries are regulated by U.S. DOT as hazardous material.

Proper Shipping Name: Battery, wet, filled with acid

Hazard Class: Corrosive Material

ID Number: UN2794

RCRA: Spent lead-acid batteries are not regulated as hazardous waste when recycled.

Spilled sulfuric acid is a characteristic hazardous waste; EPA hazardous waste number D002 (corrosivity).

CERCLA (Superfund) and EPCRA: Reportable Quantity (RQ) for spilled 100% sulfuric acid under Superfund and EPCRA (Emergency Planning and Community Right to Know Act) is 1,000 lbs. State and local reportable quantities for spilled sulfuric acid may vary.

Sulfuric acid is a listed "Extremely Hazardous Substance" under EPCRA, with a Threshold Planning Quantity (TPQ) of 1,000 lbs.

Notification is required under EPCRA if 1,000 lbs. or more of sulfuric acid is present at one site. An average automotive/commercial battery contains approximately 5 lbs. of sulfuric acid; quantity of sulfuric acid in industrial battery types will vary.

SECTION L

SHOP WIPERS

COURSE OBJECTIVE

The Objective of this course is to inform secondary level students of health and safety issues related to servicing today's vehicles, the regulations which affect the Automotive Service Industry, opportunities for preventing pollution and best management practices.

SECTIONAL OBJECTIVE

Given an information sheet and learning activities you will learn about Shop Wipers. Your performance will be evaluated by the number of correct answers you achieve on the post test. A minimum score of 80% is required to successfully complete this course.

ENABLING OBJECTIVE

1. Identify safety issues in using shop wipers.
2. Determine when a shop wiper is considered a hazardous waste.
3. Identify recycling alternatives for shop wipers.

SECTION L

SHOP WIPERS

PRE-TEST

Choose the one correct answer:

1. A shop wiper should never be used to wipe sweat from your forehead because:
 - A) Shop wipers are expensive.
 - B) Shop wipers are for cleaning grease off your hands.
 - C) Shop wipers may contain leftover cleaning agents.
 - D) Shop wipers are for cleaning parts.

2. Oil or Solvent contaminated wipers that are not dripping or saturated are classified as a:

A) Hazardous waste	B) Biodegradable waste
C) Solid waste	D) Liquid waste

3. The following methods are acceptable ways for removing excessive liquid from a saturated wiper, except for:

A) Hand wringing	B) Mechanical wringing
C) Air drying	D) Mechanical compactor

4. Any leftover free-flowing solvent or oil removed from the shop wipers must be managed as a:

A) Solid waste	B) Liquid waste
C) Non-hazardous waste	D) Hazardous waste

5. The best management practice for shop wipers is to:
 - A) Purchase disposable wipers.
 - B) Clean them yourself.
 - C) Contract with a industrial laundry service.
 - D) Never clean them.

SECTION L**SHOP WIPERS****INFORMATION
SHEET****L-1****L-2****Health and Safety Issues:**

Petroleum distillates (naphtha) may be used as cleaning agents in a variety of work places. When rags are used to clean up after such use, workers should be careful to avoid bringing the rags into contact with skin and eyes. Contact lenses should not be worn when working with petroleum distillates. If eye contact occurs, wash the eyes immediately with large amounts of water occasionally lifting the lower and upper lids. For skin, soap wash promptly.

Regulatory Issues:

DEP currently allows oil and solvent- contaminated wipers that are not saturated or dripping to be classed as a solid waste, rather than a hazardous waste, provided that best management practices are followed. Hand wringing or use of a mechanical compactor to recover as much liquid as possible is recommended. Intentional air-drying of saturated wipers is considered to be illegal disposal and may result in unpleasant health effects.

Pollution Prevention Opportunities:

To the greatest extent practicable, workers should minimize the use of rags for clean-up by avoiding spills. Managers are encouraged to choose reusable wipers in preference to incineration or landfilling the used contaminated rags.

To prevent pollution and protect worker health, the use of non-toxic alternative cleaning products is recommended.

Best Management Practice:

Contaminated rags that are not saturated may be sent to an industrial laundry and re-used. Any free-flowing solvent or oil must be collected and managed as a hazardous waste unless it is reused on-site for its intended purpose.

If the rag cannot pass the "one drop test" (as long as one drop can flow from the mixture, the mixture is saturated and therefore hazardous) it must be managed according to hazardous waste accumulation requirements.

To minimize potential fiscal and environmental liability, managers are advised to select a laundry service which has a valid permit for wastewater discharge. Call DEP's water pollution control program in the appropriate regional office for verification of the laundry's compliance status.

SECTION L

SHOP WIPERS

LEARNING ACTIVITY

A. "LIST ALTERNATIVE METHODS FOR CLEAN UP"

1. Break the class up into teams of no more than four.
2. Have each team complete the following exercises. Then ask each team to present its findings. List the different absorbent materials one might find being used in a automotive repair shop:

Example:

- | | |
|------------------------|-----------------|
| A. Clay ("Speedi Dry") | B. Saw dust |
| C. Corn husks | D. Mop |
| E. Absorbent blanket | F. Cloth wipers |
| G. Paper wipers | H. Newspaper |

3. Now ask each student to consider the following questions and provide answers.
 - A. What do you do with the soiled material?
 - B. Is it ok to just throw away this material?
 - C. Can the materials be separated and recycled?
 - D. What is the cost factor to the shop owner?
 - E. What is the cost factor to the environment?

SECTION L

SHOP WIPERS

POST-TEST

Choose the one correct answer:

1. A shop wiper should never be used to wipe sweat from your forehead because:
 - A) Shop wipers are expensive.
 - B) Shop wipers are for cleaning grease off your hands.
 - C) Shop wipers may contain leftover cleaning agents.
 - D) Shop wipers are for cleaning parts.

2. Oil or Solvent contaminated wipers that are not dripping or saturated are classified as a:

A) Hazardous waste	B) Biodegradable waste
C) Solid waste	D) Liquid waste

3. The following methods are acceptable ways for removing excessive liquid from a saturated wiper, except for:

A) Hand wringing	B) Mechanical wringing
C) Air drying	D) Mechanical compactor

4. Any leftover free-flowing solvent or oil removed from the shop wipers must be managed as a:

A) Solid waste	B) Liquid waste
C) Non-hazardous waste	D) Hazardous waste

5. The best management practice for shop wipers is to:
 - A) Purchase disposable wipers.
 - B) Clean them yourself.
 - C) Contract with a industrial laundry service.
 - D) Never clean them.

SECTION L

SHOP WIPERS

**PRE- AND
POST- TEST
ANSWER KEY**

1. C
2. B
3. C
4. D
5. C

**INFORMATION
RESOURCES**

For additional information:

Contact the Department of Environmental Protection Compliance Assistance
line (617-292-5898)

SECTION M

FLOOR DRAINS

**COURSE
OBJECTIVE**

The Objective of this course is to inform secondary level students of health and safety issues related to servicing today's vehicles, the regulations which affect the Automotive Service Industry, opportunities for preventing pollution and best management practices.

**SECTIONAL
OBJECTIVE**

Given a information sheet and learning activities you will learn about Floor Drains. Your performance will be evaluated by the number of correct answers you achieve on the post test. A minimum score of 80% is required to successfully complete this course.

**ENABLING
OBJECTIVE**

1. Identify the route water takes as it goes down the drain.
2. Identify what a oil/water separator is.
3. Identify non-toxic bay floor cleaning alternatives.

SECTION M

FLOOR DRAINS

PRE-TEST

Choose the one correct answer:

1. Floor drains that lead to septic systems or holding tanks can cause:
 - A) Water rates to increase
 - B) Low water pressure
 - C) Drinking water contamination
 - D) Higher water usage

2. Out of all the options below only one of the methods is an acceptable shop waste water management system:
 - A) Septic system
 - B) Dry well
 - C) Subsurface leaching structure
 - D) Municipal Sewer

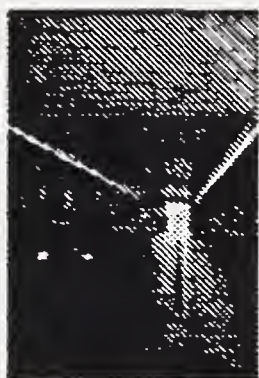
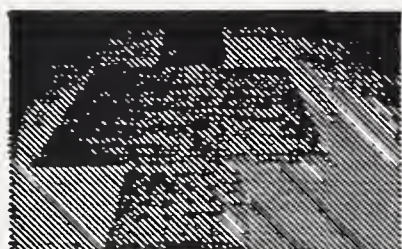
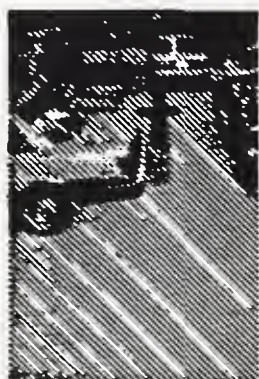
3. The items below are oil/water separators except for:

A) Sand traps	B) MDC traps
C) Interceptors	D) Liquid traps

4. Oil and water separators should be cleaned every:

A) 7 days	B) 30 days
C) 30 to 90 days	D) 60- 120 days

- 5) When cleaning bay floors you should use:
 - A) Cleaning solvent
 - B) Floor acid
 - C) Non-toxic biodegradable soap
 - D) Kerosene

SECTION M**FLOOR DRAINS****INFORMATION
SHEET****M-1****M-2****M-3****Health and Safety Issues:**

When floor drains lead to pipes which connect to a septic system or dry well, fluids entering the drain from the bay area of a vehicle maintenance operation may travel into the soil and to local drinking water supplies.

Regulatory Issues:

As mandated under the Federal Safe Drinking Water Act, the State Underground Injection Control (UIC) regulations prohibit potentially polluting discharges to injection wells. Vehicle maintenance operations commonly use unauthorized injection wells, such as floor drains leading to a septic system, dry well, or oil/water separator which leads to any leach field or cesspool.

Under the State Plumbing Code, facilities with floor drains tied to injection wells (or discharging to any surface point) have three options:

1. Seal the floor drain. Contact your local plumbing inspector for the appropriate filing form. If choosing this option, all previous discharges to the drain must be eliminated at their source. For example cars should no longer be washed in the bay area and floors should no longer be hosed down.
2. Connect the floor drain to a holding tank. The tank will need DEP approval. The DEP approves two types of holding tanks for this waste: new installations and conversions of existing (e.g. oil/water separators). These tanks are for non-hazardous industrial wastewater. If solvents, antifreeze oil and other fluids are washed down the drain, the waste is likely to be hazardous.
3. Connect the floor drain to a municipal sewer system, if available. An oil/water separator is required to be installed under this option. This requires a permit from the DEP and the local sewer authority.

In all cases, the owner must file a UIC Notification Form with DEP.

SECTION M**FLOOR DRAINS****INFORMATION
SHEET****Pollution Prevention Opportunities:**

If a drain remains, efforts should be made to minimize the pollutants which enter it. If the drain leads to the sewer,

the pollutants will pass through the waste water treatment plant. If the drain leads to a tank, keeping hazardous waste out of the tank reduces the amount of hazardous waste produced, therefore saves money. For example, it costs much more to dispose of 20 gallons of snow melt once a pint of gasoline has mixed into it than to dispose of each of those items separately.

Oil and water separators (also called sand traps, MDC traps, interceptors) are intended to promote the separation and containment of solids and oil or grease while allowing passage of the water they are mixed with. If not properly maintained, they fail to function as intended. All designs of oil and water separators require regular cleaning, the frequency of which depends on the volume of wash water going through the separator.

In general, facilities using petroleum products should clean separators at least every 30 to 90 days. The removed oily solids must be managed as waste oil, drummed and shipped as a hazardous waste. Therefore, the best pollution prevention strategy is to minimize the amount of product going into the separator.

All floor drains which discharge to subsurface leaching structures must be reconfigured, regardless of whether the drain is sealed or if it is tied to a sewer or tank.

Best Management Practice:

1. Prevent spills by properly maintaining collection equipment.
2. Clean up any spills using new technology absorbents such as pipe sponges or corn dust.
3. When cleaning bays use a non-toxic, biodegradable soap.
4. Keep oil/water separators maintained at all times.

SECTION M

FLOOR DRAINS

LEARNING ACTIVITIES

A. " LETS BUILD A FLOOR DRAIN SYSTEM"

1. Break the class up into teams of no more than four students.
2. Instruct each team to draw up plans for a floor drain system. It must be different from the one you now use.
3. The floor drain plan must include the following:
 - A. Drain Diagram
 - B. Cleaning soaps and chemicals to be used.
 - C. Method of maintaining the drain.
4. The team with the best overall system does not have to clean the shop for a week!

SECTION M

FLOOR DRAINS

POST TEST

Choose the one correct answer:

1. Floor drains that lead to septic systems or injection wells can cause:
 - A) Water rates to increase
 - B) Low water pressure
 - C) Drinking water contamination
 - D) Higher water usage

2. Out of all the options below only one of the methods is an acceptable shop waste water management system:
 - A) Septic system
 - B) Dry well
 - C) Subsurface leaching structure
 - D) Municipal Sewer

3. The items below are oil/water separators except for:

A) Sand traps	B) MDC traps
C) Interceptors	D) Liquid traps

4. Oil and water separators should be cleaned every:

A) 7 days	B) 30 days
C) 30 to 90 days	D) 60- 120 days

- 5) When cleaning bay floors you should use:
 - A) Cleaning solvent
 - B) Floor acid
 - C) Non-toxic biodegradable soap
 - D) Kerosene

SECTION M

FLOOR DRAINS

**PRE- AND
POST- TEST
ANSWER KEY**

1. C
2. D
3. D
4. C
5. C

**INFORMATION
RESOURCES**

For additional information:

Contact The Department of Environmental Protection, Division of Water Supply (617-292-5770)

SECTION N CARBON MONOXIDE & EXHAUST SYSTEMS

COURSE OBJECTIVE

The Objective of this course is to inform secondary level students of health and safety issues related to servicing today's vehicles, the regulations which affect the Automotive Service Industry, opportunities for preventing pollution and best management practices.

SECTIONAL OBJECTIVE

Given a information sheet and learning activities you will learn about Exhaust Gas Exposure. Your performance will be evaluated by the number of correct answers you achieve on the post test. A minimum score of 80% is required to successfully complete this course.

ENABLING OBJECTIVE

1. Identify the hazards of exhaust gas exposure.
2. Learn the symptoms associated with exposure.
3. Identify the best methods to avoid exhaust gas exposure.
4. Identify the regulations relating to emission controls.

SECTION N CARBON MONOXIDE & EXHAUST SYSTEMS

PRE-TEST

Choose the one correct answer:

1. Exhaust gas enter the body through:
A) Ingestion B) Skin absorption
C) Inhalation D) Contact
2. Exhaust gas exposure interferes with the body's use of:
A) Carbon monoxide B) Carbon dioxide
C) Hydrocarbons D) Oxygen
3. Carbon Monoxide and Carbon Dioxide are:
A) Gases that smell like rotten eggs
B) Red in color
C) Green in color
D) Odorless and colorless
4. Symptoms of exhaust gas exposure include all of the following except:
A) Headache B) Irritability
C) Weakness D) Alertness
5. The following are good exhaust gas exposure prevention techniques:
A) Inspect exhaust system for leaks before testing.
B) Attach a leakproof hose and check it during testing.
C) Shut vehicle down and exit for fresh air if head hurts.
D) All of the above

SECTION N CARBON MONOXIDE & EXHAUST SYSTEMS

INFORMATION SHEET



N-1



N-2

Health and Safety Issues:

Exhaust gas contains asphyxiants, gases that can cause suffocation by interfering with the body's use of oxygen. Asphyxiants in exhaust deprive the body of oxygen in two ways. Carbon Dioxide at high levels will "thin out" the available oxygen reducing the amount getting into the lungs. Carbon Monoxide will take the place of oxygen in the blood even if there is enough oxygen available. Both of these gasses are colorless and odorless and can concentrate to dangerous levels with little warning.

Symptoms of overexposure include headache, irritability, weakness, impairment of judgment, and confusion. These symptoms often go unnoticed leading to more severe effects including fainting, unconsciousness, and death due to respiratory failure. Therefore, good ventilation is important in areas where asphyxiants, especially carbon monoxide, are a problem.

Regulatory Issues:

Contrary to popular belief, removing emission control devices does not increase fuel economy. In fact, removing them may shorten the life and overall performance of your customer's vehicle. It is illegal under federal law to remove, disconnect, damage or in any way render inoperative any emission control device or element of design installed on a motor vehicle or motor vehicle engine. Dealerships, repair shops, fleet maintenance and even individuals are covered by this tampering law. Each violation could cost up to \$2,500 in fines.

Pollution Prevention Opportunities:

Catalytic converters are installed on the exhaust system to oxidize hydrocarbons and carbon monoxide and to reduce nitrogen oxides. In large part because of catalytic converters (but also because of better inspection and maintenance and phase-out of leaded gas), today's cars emit about 90% less pollution than cars did in the 1960's.

SECTION N CARBON MONOXIDE & EXHAUST SYSTEMS

INFORMATION SHEET

Best Management Practice:

1. Inspect the exhaust system of a vehicle which is to be run inside the shop. Be sure there are no leaks that would allow exhaust gas to escape.
2. Attach a leakproof hose to the exhaust pipe of the vehicle and run the hose into a exhaust gas collection hole or to the outside air.
3. Periodically inspect the exhaust hose to be sure it has not fallen off the exhaust pipe during testing.
4. If at any time during vehicle testing you start to get a headache, suspect carbon monoxide exposure, shut the vehicle down and get some fresh air.
5. During replacement of a catalytic converter follow these steps:
 - A. Check to be sure that the catalytic converter to be installed indicates that it was properly tested to meet EPA guidelines. (Replacement parts may be made by independent aftermarket parts manufacturers.)
 - B. Install the same type of catalytic converter that was installed on the car by the manufacturer (2 way, 3 way) in the same location and properly connect all existing air injection components (e.g. air tube).
 - C. Fill out a warranty card for the customer.
 - D. Tag the removed catalytic converter and keep it on the premises for 15 days in case an inspector shows up. Tag or mark it with a grease pen with the following information: customer's name, vehicle make, model and year, engine size, customer's order number, date of work and mileage of vehicle.
 - E. Complete a work invoice with the customer's name, address, vehicle make, model, year, and mileage. Have the customer sign a statement explaining why the catalytic converter was replaced.

SECTION N CARBON MONOXIDE & EXHAUST SYSTEMS

LEARNING ACTIVITY

A. "CLASSROOM DISCUSSION"

1. As a class ask the students the following questions:
 - A. Why are exhaust fumes harmful to humans?
 - B. How much carbon monoxide does it take to kill?
 - C. Why should every school, shop, garage have a carbon monoxide detector?
 - D. What are the effects of prolonged carbon monoxide exposure?
 - E. Can carbon monoxide poisoning occur while driving in an automobile?

SECTION N CARBON MONOXIDE & EXHAUST SYSTEMS

POST-TEST

Choose the one correct answer:

1. Exhaust gas enter the body through:
A) Ingestion B) Skin absorption
C) Inhalation D) Contact
2. Exhaust gas exposure interferes with the body's use of:
A) Carbon monoxide B) Carbon dioxide
C) Hydrocarbons D) Oxygen
3. Carbon Monoxide and Carbon Dioxide are:
A) Gases that smell like rotten eggs
B) Red in color
C) Green in color
D) Odorless and colorless
4. Symptoms of exhaust gas exposure include all of the following except:
A) Headache B) Irritability
C) Weakness D) Alertness
5. The following are good exhaust gas exposure prevention techniques:
A) Inspect exhaust system for leaks before testing.
B) Attach a leakproof hose and check it during testing.
C) Shut vehicle down and exit for fresh air if head hurts.
D) All of the above

SECTION N CARBON MONOXIDE & EXHAUST SYSTEMS

**PRE- AND
POST- TEST
ANSWER KEY**

1. C
2. D
3. D
4. D
5. D

**INFORMATION
RESOURCES**

For additional information contact:
Department of Environmental Protection, Air Quality Program
(617-292-5630)

SECTION O

A/C REFRIGERANTS

**COURSE
OBJECTIVE**

The Objective of this course is to inform secondary level students of health and safety issues related to servicing today's vehicles, the regulations which affect the Automotive Service Industry, opportunities for preventing pollution and best management practices.

**SECTIONAL
OBJECTIVE**

Given a information sheet and learning activities you will learn about A/C Refrigerants. Your performance will be evaluated by the number of correct answers you achieve on the post test. A minimum score of 80% is required to successfully complete this section.

**ENABLING
OBJECTIVE**

1. Identify what the "Ozone" layer is.
2. Identify the regulations governing A/C servicing.
3. Identify the recycling requirements for refrigerant.

SECTION O

A/C REFRIGERANTS

PRE-TEST

Choose the one correct answer:

1. Chlorofluorocarbons also go by the trade name:

A) Laughing gas	B) Helium
C) Freon	D) Nitrogen

2. The protective layer of gas above the earth called "Ozone" is:

A) 1 mile above the earth	B) 5 miles above the earth
C) 10-30 miles above the earth	D) 50 miles above the earth

3. Technicians who repair or service a/c systems must be:

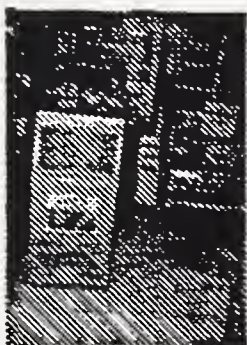
A) Specialists	B) Competent
C) Trained and certified	D) Master technicians

4. Technicians must use a/c equipment approved by the:

A) MSPCA	B) MDC
C) EPA	D) MWRA

5. The sale of CFC's in quantities of less than 20 lbs to anyone other than a certified technician is:

A) Not advisable	B) Permissible
C) Prohibited	D) Not regulated

SECTION O**A/C REFRIGERANTS****INFORMATION
SHEET****O-1****O-2****Health and Safety Issues:**

Scientists believe that synthetic chemicals, such as chlorofluorocarbons (CFCs, also known by the trade name Freon), are rapidly destroying a protective layer of gas (ozone) 10 to 30 miles above the earth, which protects us from the sun's harmful ultraviolet rays.

In 1990 an international treaty to protect the ozone layer was signed by 75 countries including the United States. Congress enacted amendments to the Clean Air Act which establish rules for the release of refrigerants during the servicing of motor vehicle air conditioners. CFC-12 in motor vehicles is estimated to account for over 20% of all CFC use in this country. When released to the stratosphere during vehicle servicing, the CFCs can remain active for up to 120 years.

Experts say that ozone loss in the atmosphere may lead to an increase in skin cancer and cataracts and could weaken the human immune system. Agriculture, as well as plant and animal life, may also be dramatically affected.

Regulatory Issues:

Technicians who repair or service motor vehicle air conditioners must be trained and certified by an EPA approved organization. Training programs cover the use of recycling equipment in compliance with SAE Standard J-1989, the regulatory requirements, the importance of refrigerant containment and the effects of ozone depletion. To be certified, technicians must pass a test demonstrating their knowledge in these areas.

To assure that all air conditioning service is done by qualified technicians, the sale of containers of CFCs under 20 pounds to anyone other than a certified technician is prohibited. By this requirement, EPA encourages "do-it-yourselfers" to bring their cars to certified technicians with approved equipment.

Service shops must certify to the EPA that they own approved equipment and that the technicians using the equipment are certified. If refrigerant is recovered and sent to a facility, the name and address of that facility must be retained for three years.

Technicians must use either refrigerant recover/recycle or recover-only equipment approved by the EPA. Most certified equipment will be labeled as "design-certified to SAE standards".

SECTION O

A/C REFRIGERANTS

INFORMATION SHEET

The recover/recycle equipment both recovers the refrigerant and processes it through an oil separator, a filter and a dryer. The recycled refrigerant is suitable for reuse in any motor vehicle air conditioner that uses that type of refrigerant.

The recover-only equipment removes the refrigerant from the A/C unit and transfers it to a holding tank. Technicians are then required by law to either recycle the used refrigerant on site or send it to an off-site reclamation facility. The spent refrigerant which is going off-site for reclamation is exempt from being managed as a hazardous waste.

The Clean Air Act Amendments require a complete phaseout of CFCs, halons, carbon tetrachloride and methyl chloroform by the year 2000. Hydrochlorofluorocarbons (HFCFs) will be phased out of production by the year 2030.

Pollution Prevention Opportunities:

Use alternative refrigerants, as they become available. For a listing contact EPA or for other information on retro-fitting, contact the vehicle manufacturer.

Best Management Practice:

Assure that any technician who is performing motor vehicle air conditioning service is trained and certified.

SECTION O

A/C REFRIGERANTS

LEARNING ACTIVITIES

A. "GROUP DISCUSSION"

Ask the students to participate in the answers to the following questions:

- A. What is wrong with refrigerant R-12?
- B. How will I be able to get service on my car that has R-12 when they stop producing it?
- C. What is R-134A refrigerant?
- D. Can I mix R-12 with R 134a? If not, why not?
- E. Why must refrigerant servicing equipment be licensed?
- F. Why must a/c servicing technicians be certified?
- G. What would happen if the "ozone" layer disappeared?
- H. How can I find a qualified shop with a certified technician to repair my vehicle?

SECTION O

A/C REFRIGERANTS

POST-TEST

Choose the one correct answer:

1. Chlorofluorocarbons also go by the trade name:

A) Laughing gas	B) Helium
C) Freon	D) Nitrogen

2. The protective layer of gas above the earth called "Ozone" is:

A) 1 mile above the earth	B) 5 miles above the earth
C) 10-30 miles above the earth	D) 50 miles above the earth

3. Technicians who repair or service a/c systems must be:

A) Specialists	B) Competent
C) Trained and certified	D) Master technicians

4. Technicians must use a/c equipment approved by the:

A) MSPCA	B) MDC
C) EPA	D) MWRA

5. The sale of CFC's in quantities of less than 20 lbs to anyone other than a certified technician is:

A) Not advisable	B) Permissible
C) Prohibited	D) Not regulated

SECTION O

A/C REFRIGERANTS

**PRE- AND
POST- TEST
ANSWER KEY**

1. C
2. C
3. C
4. C
5. C

**INFORMATION
RESOURCES**

For additional information contact:

EPA Region I (617-565-3225) or the Stratospheric Ozone Information Hotline
in Washington at (800-296-1996) 10-4 EST

SECTION P

INSPECTION AND MAINTENANCE 240

**COURSE
OBJECTIVE**

The Objective of this course is to inform secondary level students of health and safety issues related to servicing today's vehicles, the regulations which affect the Automotive Service Industry, opportunities for preventing pollution

**SECTIONAL
OBJECTIVE**

Given a information sheet and learning activities you will learn about Inspection and Maintenance 240. Your performance will be evaluated by the number of correct answers you achieve on the post test. A minimum score of 80% is required to successfully complete this course.

**ENABLING
OBJECTIVE**

1. Define what I/M 240 is.
2. Identify the components of the new emission test.
3. Identify the process of repair after a car fails test.

SECTION P**INSPECTION AND MAINTENANCE 240****PRE-TEST**

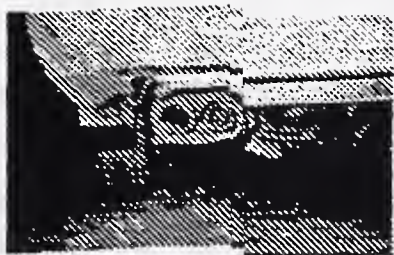
Choose the one correct answer:

1. Older vehicles and vehicles that run poorly may emit high levels of:
A) Hydrocarbons B) Freon
C) Helium D) Propane
2. Volatile organic compounds (VOC's) and Nitrogen Oxides (NO_x) produce:
A) Hydrogen gas B) Butane gas
C) Ground level ozone D) Map gas
3. Ground level ozone when exposed to direct sunlight in the atmosphere causes:
A) Hydrogen B) Carbon monoxide
C) Carbon dioxide D) Smog
4. Under the new law, a transient emission test will be required on vehicles from:
A) 1971 to current model. B) 1975 to current model.
C) 1981 to current model. D) 1990 to current model.
- 5) Prior to performing a transient emission test the vehicle must be driven for:
A) 5 minutes B) 60 minutes
C) 20 minutes D) 90 minutes

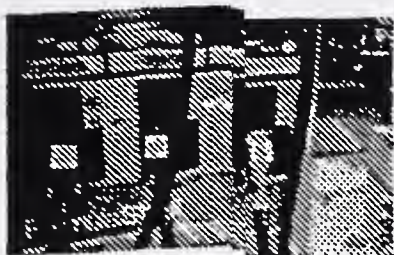
INFORMATION SHEET



P-1



P-2



P-3

Health and Safety Issues:

Older vehicles and those which have not been regularly maintained may be emitting high levels of carbon monoxide and hydrocarbons while running. Because carbon monoxide is a colorless and odorless gas, it may not be easily detected. Workers may experience dizziness and breathing difficulties if inspection and maintenance takes place in a confined area.

The sources of man-made smog (ground level ozone) are volatile organic compounds (VOC'S) and nitrogen oxides (NOx), fifty percent of which are attributed to motor vehicles and fuels. Ground level ozone, which is formed by these gases, reacts in the atmosphere in the presence of strong sunlight, causing significant health problems during the summer.

Regulatory Issues:

The Clean Air Act (CAA) Amendments of 1990 require Enhanced Motor Vehicle Inspection and Maintenance (I/M) for certain areas of the country that exceed the national ambient air quality standards for ground level ozone.

Massachusetts has been classified as a "serious" ozone non-attainment area, statewide. As such, the Commonwealth is required to provide for an "enhanced" motor vehicle emissions inspection and maintenance program that will reduce hydrocarbon, carbon monoxide and NOx emissions from light duty automobiles and trucks.

The Massachusetts Legislature enacted "An Act Relative to Enhancing the Commonwealth's Motor Vehicle Emissions and Safety Inspection Program" (Chapter 490 of the Acts of 1993), based on a two year study by a Special Legislative Commission, which included representatives of the automotive repair industry.

Actual operation of the new program is to begin on a portion of the Commonwealth's vehicle fleet on July 1, 1995 and be fully phased-in over a period of time beginning in January 1996 and ending December 31, 1997. It will include:

1. A network of centralized, test-only emissions inspection facilities throughout the Commonwealth.
2. Licensing of repair facilities and certification and training of repair technicians.
3. All 1971 and later model year light duty vehicles will be subject to a biennial emissions inspection and an annual safety inspection.
4. Inspection for vehicles 1981 to current model year will receive an

SECTION P**INSPECTION AND MAINTENANCE 240****INFORMATION
SHEET**

emissions inspection which involves testing while the vehicle is mounted on a chassis dynamometer and simulates actual driving conditions.

5. Evaporative emissions will be tested using a purge system check, as well as an evaporative emissions system integrity pressure test.
6. No waivers will be allowed for vehicles and parts covered by an emissions control performance warranty, or for tampering related repairs.
7. Waivers will be allowed for non-warranty-covered emission-related repairs only if the expenditures for such repairs exceed \$450 (adjusted annually for changes in the Consumer Price Index based on 1989 dollars).

In addition to the biennial and annual inspections, the program includes:

1. Tampering inspections
2. On-road emission testing
3. Enforcement through denial of vehicle registration
4. Assurance that adequate administrative features, management resources, and management practices are in place to attain and maintain EPA's performance standard.

Pollution Prevention Opportunities:

Under these regulations, emissions of VOC's are expected to be reduced by 28 percent, NO_x will be reduced by 9 percent, and CO will be reduced by 30 percent.

The best pollution prevention strategy for vehicle owners is to keep their vehicle well maintained and in good running condition. The new testing procedure will encourage this.

Implications for the Vehicle Maintenance Industry:

In a high-tech, Enhanced I/M test system, repair technicians will be faced with a more rigorous exhaust emission test procedure in the transient emission test. Repairs to pass the transient test may require greater diagnostic proficiency on the part of the technician than what is generally needed in response to an emissions failure under the current idle test. If technicians are not prepared to meet the new challenge, motorists may be put in the awkward position of failing the retest at higher-than-necessary rates, requiring yet another trip to the repair facility and then to retest. This is often referred to as ping-ponging.

A variety of strategies have been suggested as ways of dealing with ping-ponging. The public will be best served if an adequate number of technicians have the training and the tools needed to diagnose today's high-tech cars. The Department and the Registry will be overseeing such training during the coming year.

SECTION P

INSPECTION AND MAINTENANCE 240

**INFORMATION
SHEET**

Best Management Practice:

The most frequent cause of test failures is inadequate warm-up time before the inspection. The vehicle should be driven for at least 20 minutes before the test. This preconditioning ensures that pollution control devices are operating at maximum efficiency, the engine is idling at the correct speed, and the automatic choke is disengaged.

Most emissions problems can be corrected by routine maintenance such as carburetor adjustments, tune-up related repairs, and replacement or adjustment of emissions control system components.

SECTION P

INSPECTION AND MAINTENANCE 240

**LEARNING
ACTIVITIES**

A. "GROUP DISCUSSION"

Ask the students to participate in the answers to the following questions:

- A. What is the difference between the new I&M 240 test and the old I&M test.
- B. What happens if the vehicle fails?
- C. What is the amount the customer has to spend in order to try to get the vehicle to pass?
- D. Who is the person approved to perform Emission related repairs?
- E. What is a waiver?
- F. Why is a dynamometer used in the I&M 240 test?
- G. How often will a vehicle have to go to a I&M 240 test center for an emission inspection sticker?
- H. How will a customer be able to find an emission certified repair technician?

SECTION P

INSPECTION AND MAINTENANCE 240

POST-TEST

Choose the one correct answer:

1. Older vehicles and vehicles that run poorly may emit high levels of:

A) Hydrocarbons	B) Freon
C) Helium	D) Propane

2. Volatile organic compounds (VOC's) and Nitrogen Oxides (NOx) produce:

A) Hydrogen gas	B) Butane gas
C) Ground level ozone	D) Map gas

3. Ground level ozone when exposed to direct sunlight in the atmosphere causes:

A) Hydrogen	B) Carbon monoxide
C) Carbon dioxide	D) Smog

4. Under the new law, a transient emission test will be required on vehicles from:

A) 1971 to current model.	B) 1975 to current model.
C) 1981 to current model.	D) 1990 to current model.

- 5) Prior to performing a transient emission test the vehicle must be driven for:

A) 5 minutes	B) 60 minutes
C) 20 minutes	

SECTION P

INSPECTION AND MAINTENANCE 240

**PRE- AND
POST- TEST
ANSWER KEY**

1. A
2. C
3. D
4. C
5. C

**INFORMATION
RESOURCES**

For additional information contact:

U.S.E.P.A. Office of Mobile Sources (6406J)

401 M Street, S.W.

Washington, D.C. (202-233-9029)

Publishes "Vehicle Maintenance Initiative Update"

Department of Environmental Protection Division of Inspection and Maintenance (617-292-5629)

SECTION Q**COMPLIANCE INSPECTIONS****COURSE
OBJECTIVE**

The Objective of this course is to inform secondary level students of health and safety issues related to servicing today's vehicles, the regulations which affect the Automotive Service Industry, opportunities for preventing pollution and best management practices.

**SECTIONAL
OBJECTIVE**

Given a information sheet and learning activities you will learn about Compliance Inspections. Your performance will be evaluated by the number of correct answers you achieve on the post test. A minimum score of 80% is required to successfully complete this section.

**ENABLING
OBJECTIVE**

1. Identify who performs compliance inspections.
2. Identify what the inspector is looking for.
3. Identify what happens when violations are detected.

SECTION Q**COMPLIANCE INSPECTIONS****PRE-TEST**

Choose the one correct answer:

1. The DEP Inspector will:
 - A) Call ahead to set up an inspection appointment.
 - B) Mail a "request to visit" form to the company.
 - C) Usually arrive unannounced.
 - D) Secure a court order to visit the company.

2. In addition to detecting violations the DEP inspector may also:
 - A) Buy the company lunch.
 - B) Suggest ways to increase worker exposure to hazards.
 - C) Provide educational materials.
 - D) Avoid discussion of other environmental laws.

3. Immediately, upon entering your operation, the inspector will:
 - A) Ask to use the phone
 - B) Introduce him/herself and show DEP identification.
 - C) Ask to see the hazardous waste.
 - D) Ask to see the person in charge.

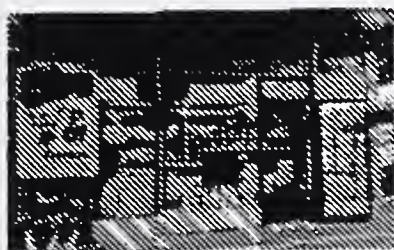
4. The inspector will want to see:
 - A) The company's tax return for the last three years.
 - B) The last employee that was hired on the job.
 - C) The operations and areas of waste accumulation.
 - D) The blueprints for the plant.

5. Upon completion of the inspection, the inspector will:
 - A) Ask the manager to make out a check for the fines.
 - B) Increase shop production.
 - C) Discuss any hazardous waste problems or other violations.
 - D) Suggest a new product line.

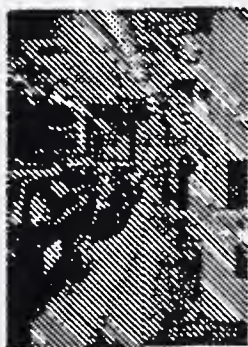
SECTION Q

COMPLIANCE INSPECTIONS

INFORMATION SHEET



Q-1



Q-2

Department of Environmental Protection personnel have the authority to inspect any business or commercial operation which is known to handle hazardous waste, or which the Department has reasonable cause to believe handles hazardous waste, as well as businesses which may be subject to the Clean Air Act, Safe Drinking Water Act and the Clean Water Act.

Here are some tips on what may happen during an inspection:

A DEP inspector or inspectors will usually arrive unannounced.

Upon entering your operation the inspector will introduce him or herself to the receptionist, show DEP identification and ask to see the person in charge of daily operations.

The inspector will explain the purpose of the inspection and ask the person in charge for:

1. A verbal description of the operation, its processes, products, and the types and quantities of wastes produced.
2. If gasoline is dispensed, the inspector may check the condition of the nozzles, hoses and related equipment for leaks or evidence of damage.
3. If there are floor drains in the bay area, the inspector will question where the drains go and what happens to any waste which goes down these drains.
4. Use of parts cleaning equipment will be reviewed to determine whether units are covered while not in use.
5. Sources of hazardous waste will be reviewed and the hazardous waste storage area will be checked for signage and labels on drums showing date of accumulation began. Records of hazardous waste shipments will be checked to verify the generator's status.
6. The person in charge will be asked about emergency preparation.
7. The outdoor area around the facility may be inspected for possible soil contamination and accumulation of hazardous waste.

The inspection will conclude with:

1. A discussion of problems or violations and ways in which the company can correct them. A written record of the inspection will be mailed with a requirement for a timely correction of any violations.
2. A discussion on pollution prevention opportunities.

SECTION Q

COMPLIANCE INSPECTIONS

**LEARNING
ACTIVITY**

A. "IS OUR SCHOOL IN COMPLIANCE?"

1. Break the class up into teams of no more than four students.
2. Ask each team pick a section from 4-15 out of the A.T.E.A.M. training manual and perform a simulated compliance inspection of the shop in that area.
3. Each team should be prepared to give an oral and written presentation on their "compliance inspection".
4. Each team should make recommendations to improve items they discovered during their "compliance inspection".
5. The team with the best improvement list wins!

SECTION Q**COMPLIANCE INSPECTIONS****POST-TEST**

Choose the one correct answer:

1. The Dep Inspector will:
 - A) Call ahead to set up an inspection appointment.
 - B) Mail a "request to visit" form to the company.
 - C) Usually arrive unannounced.
 - D) Secure a court order to visit the company.

2. In addition to detecting violations the DEP inspector may also:
 - A) Buy the company lunch.
 - B) Suggest ways to increase worker exposure to hazards.
 - C) Provide educational materials.
 - D) Avoid discussion of other environmental laws.

3. Immediately, upon entering your operation, the inspector will:
 - A) Ask to use the phone
 - B) Introduce him/herself and show DEP identification.
 - C) Ask to see the hazardous waste.
 - D) Ask to see the person in charge.

4. The inspector will want to see:
 - A) The company's tax return for the last three years.
 - B) The last employee that was hired on the job.
 - C) The operations and areas of waste accumulation.
 - D) The blueprints for the plant.

5. Upon completion of the inspection, the inspector will:
 - A) Ask the manager to make out a check for the fines.
 - B) Increase shop production.
 - C) Discuss any hazardous waste problems or other violations.
 - D) Suggest a new product line.

SECTION Q

COMPLIANCE INSPECTIONS

**PRE- AND
POST- TEST
ANSWER KEY**

1. C
2. C
3. B
4. C
5. C

**INFORMATION
RESOURCES**

For further information contact:

Department of Environmental Protection Compliance Assistance Line at (617-292-5898)

SECTION R**EMERGENCY SPILL PROCEDURES****COURSE
OBJECTIVE**

The Objective of this course is to inform secondary level students of health and safety issues related to servicing today's vehicles, the regulations which affect the Automotive Service Industry, opportunities for preventing pollution and best management practices.

**SECTIONAL
OBJECTIVE**

Given a information sheet and learning activities you will learn about Emergency Spill Procedures. Your performance will be evaluated by the number of correct answers you achieve on the post test. A minimum score of 80% is required to successfully complete this course.

**ENABLING
OBJECTIVE**

1. Identify who an emergency coordinator is.
2. Identify the components of a emergency response system.
3. Identify the proper procedure to handle a minor spill.

SECTION R**EMERGENCY SPILL PROCEDURES****PRE-TEST**

Choose the one correct answer:

1. As a generator of hazardous waste you are required to:
 - A) Assume the police will come in a emergency.
 - B) Assume the fire department will come in a emergency.
 - C) Prepare for an emergency.
 - D) Provide to the chemical supplier an action plan.

2. If the emergency coordinator is not available in an emergency, employees should seek out:
 - A) The investors in the company.
 - B) The security guard.
 - C) The shop owner.
 - D) The back-up coordinator.

3. Each employee in the company should be familiar with:
 - A) The best place to buy lunch.
 - B) Established emergency procedures.
 - C) Where the office supplies are kept.
 - D) Where the copy machine is.

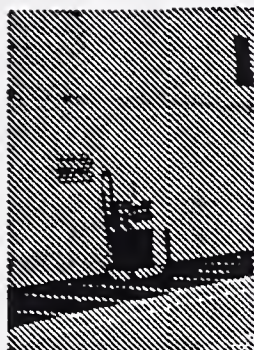
4. Minor spills can be contained through:
 - A) Washing them down the drain.
 - B) Leaving them for the janitor to clean.
 - C) Proper and efficient management.
 - D) Pouring solvent on the floor.

5. In managing a hazardous waste spill you must follow:
 - A) Your partner's directions.
 - B) What you think is the right course of action.
 - C) Federal and State Regulations.
 - D) The customer's request.

INFORMATION SHEET



R-1



R-2

SECTION R

EMERGENCY SPILL PROCEDURES

Compliance Issues:

As a generator of hazardous waste you are required to prepare for emergencies.

The following are the components of a well planned out emergency response system:

1. Appoint an emergency coordinator who is responsible for planning and implementation of your emergency response system.
2. Assign a back-up coordinator in case the emergency coordinator is unavailable.
3. Establish a method of communication with all employees in the event of an emergency spill.
4. Provide a telephone or other device for contacting the police, fire department or emergency spill response team.
5. Provide and maintain a variety of fire extinguishers and fire control equipment.
6. Insure there is a convenient adequately pressured water supply available to respond to a fire.
7. Periodically test and maintain the equipment so it will be working in case of an emergency.
8. Instruct each employee on the established emergency procedures.
9. Have all exits clearly marked.
10. Create and post emergency evacuation plans and emergency phone numbers in all of the work areas.
11. Contact the police and fire departments, the local board of health, and any emergency response teams with information regarding the type of hazardous materials you use and wastes you generate.

Employee Issues:

Minor spills which are efficiently and properly managed can prevent unnecessary clean up expense and will lead to a safer and more productive working environment.

In all cases, whenever managing a hazardous waste spill or hazardous material spill, follow all federal and state regulations.

Your emergency coordinator should be able to provide you with information on the best management practices for the types of spills you encounter.

SECTION R**EMERGENCY SPILL PROCEDURES****LEARNING
ACTIVITY****A. "A HAZARDOUS WASTE SPILL HAS OCCURRED"**

1. Break the class up into teams of no more than four students.
2. Inform each team that a hazardous waste spill of 5 to 10 quarts of used oil has just occurred under a car which is on a lift getting a "Quick" oil change done. The customer is in the waiting room and has observed the spill.
3. Ask the students to create a realistic role play scenario based on the following perspectives:

A. The first scenario is of a confused technician with no means to immediately handle the spill.

1. What does the floor look like within 30 minutes?
2. What is the technician thinking?
3. What is the customer thinking?
4. What is the shop owner thinking?

B. The second scenario is of a quick containment and proper storage of the spill.

1. What does the floor look like within 30 minutes?
2. What is the technician thinking?
3. What is the customer thinking?
4. What is the shop owner thinking?
4. The team with the most realistic role play wins!

SECTION R**EMERGENCY SPILL PROCEDURES****POST-TEST**

Choose the one correct answer:

1. As a generator of hazardous waste you are required to:
 - A) Assume the police will come in a emergency.
 - B) Assume the fire department will come in a emergency.
 - C) Prepare for an emergency.
 - D) Provide to the chemical supplier an action plan.

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5. In managing a hazardous waste spill you must follow:
 - A) Your partner's directions.
 - B) What you think is the right course of action.
 - C) Federal and State Regulations.
 - D) The customer's request.

SECTION R**EMERGENCY SPILL PROCEDURES****PRE- AND
POST- TEST
ANSWER KEY**

1. C
2. D
3. B
4. C
5. C

**INFORMATION
RESOURCES**

For additional information contact:

Department of Environmental Protection Compliance Assistance Line (617-292-5898)

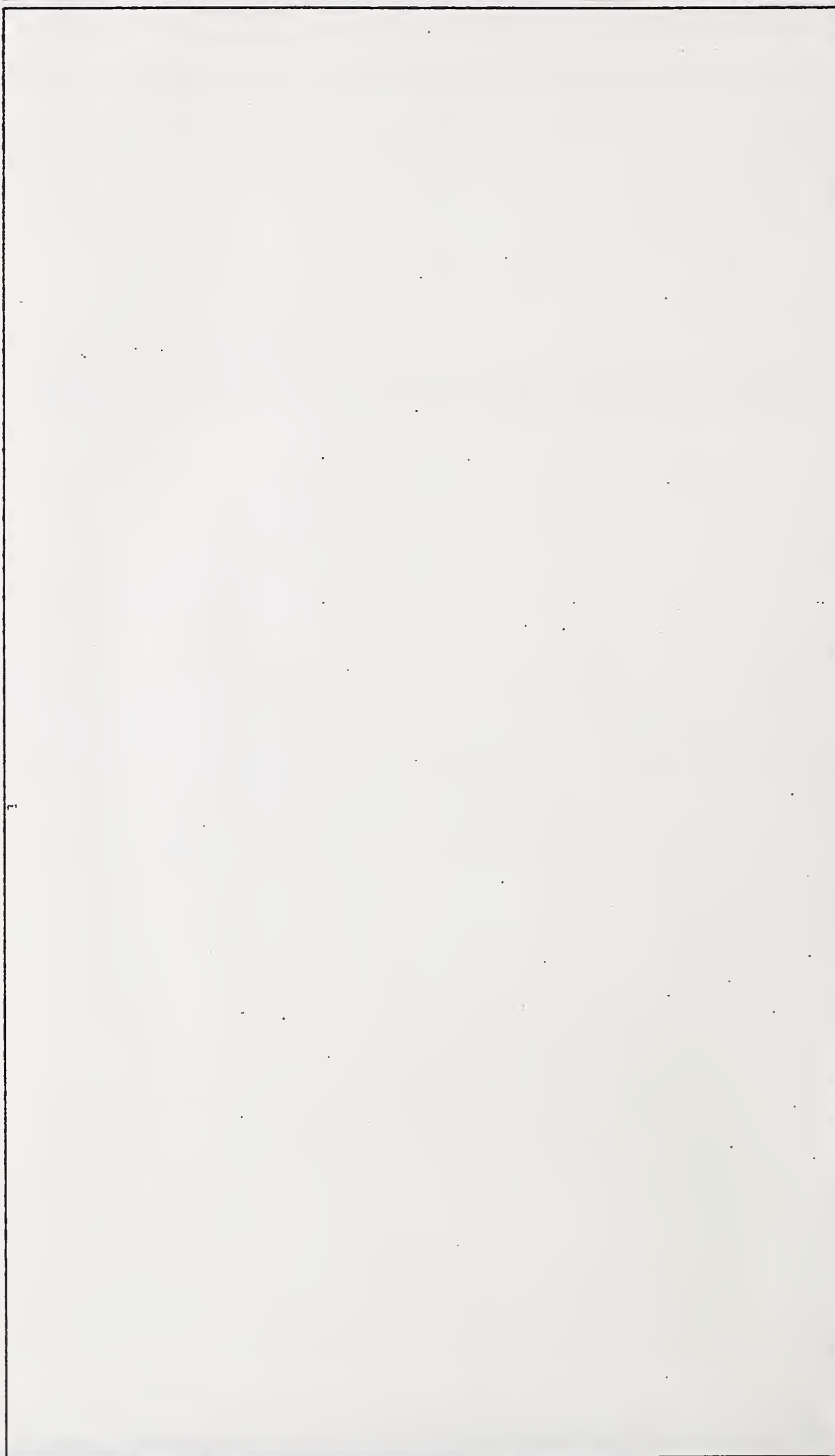
SECTION S

FUTURE MODULE

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SECTION T

FUTURE MODULE



SECTION U

ABBREVIATIONS

BRP	Bureau of Resource Protection
BWP	Bureau of Waste Prevention
BWSC	Bureau of Waste Site Cleanup
CAAA	Clean Air Act Amendments of 1990
CMR	Commonwealth of Massachusetts Regulation
CO	Carbon Monoxide
DAQC	Division of Air Quality Control
DEP	Department of Environmental Protection
DPS	Department of Public Safety
DWPC	Division of Water Pollution Control
DWS	Division of Water Supply
EPA	Environmental Protection Agency (Federal)
HCS	Hazard Communication Standard
I/M	Inspection and Maintenance
KG	Kilogram
LQG	Large Quantity Generator
LTBI	Location to be Investigated
MCP	Massachusetts Contingency Plan
Mg/l	Milligrams per liter
MGL	Massachusetts General Law
MSDS	Material Safety Data Sheet
MWRA	Massachusetts Water Resources Authority
NO _x	Oxides of Nitrogen
NPDES	National Pollution Discharge Elimination System
OSHA	Occupational Safety and Health Administration
OTA	Office of Technical Assistance
PAH	Polynuclear Aromatic Hydrocarbons
POTW	Publicly Owned Treatment Works
PPB	Parts Per Billion
PPM	Parts Per Million
QA/QC	Quality Assurance/Quality Control
RCRA	Resource Conservation and Recovery Act
RMV	Registry of Motor Vehicles
RPM	Revolutions per Minute
RVP	Reid Vapor Pressure
SDWA	Safe Drinking Water Act
SQG	Small Quantity Generator
TCLP	Toxicity Characteristic Leaching Procedure
TPH	Total Petroleum Hydrocarbons
TURA	Toxic Use Reduction Act
TURI	Toxic Use Reduction Institute
UIC	Underground Injection Control
UST	Underground Storage Tank
VOC	Volatile Organic Compounds
VSQG	Very Small Quantity Generator

SECTION V

RESOURCES

CONTACTS

Department of Environmental Protection
One Winter Street
Boston, Mass. 02108

Hazardous Waste Compliance Assistance Line	(617-292-5898)
Air Quality Program	(617-292-5605)
Asbestos Coordinator	(617-292-5930)
Solid Waste Management	(617-292-5960)
Division of Water Supply	(617-292-5770)
Inspection and Maintenance	(617-292-5629)

Office of Technical Assistance (617-727-3260)
100 Cambridge St.
Boston, Mass. 02202

United States Environmental Protection Agency
JFK Federal Building
Boston, Mass. 02203-2211

General Assistance Line	(617-565-3225)
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Automotive Recyclers of Mass. (617-272-7737)
50 Mall Rd. Suite 200
Burlington, Mass. 01830

Mass. Auto Body Association (800-487-6222)
50 Mall Rd. Suite 200
Burlington, Mass. 01830

Mass. Auto Dealers Association
59 Temple Place
Boston, Mass. 02111

N.E. Service Station & (508-667-7706)
Auto Repair Association
574 Boston Rd. Suite 12
Billerica, MA. 01821

SECTION V

RESOURCES

SLIDES

Additional Slides on Related Topics:

Wilmington, Mass. 01887

Contact: Ellen Frye (508-658-0500)

American Lung Association Automotive Curriculum, Seattle

Contact: Margo Harris (206-932-7378)

RELATED CURRICULA

EHMI- The Automobile Care for the Environment program

"the Lean, Green, Drivin' Machine" video (Grades 10-11)

10 Newmarket Road

P.O. Box 932, Durham, NH 03824

Contact: Theresa Walker (603-868-1496)

FIELD TRIPS FOR TEACHERS

(MINIMUM OF 5,
MAXIMUM OF 15)

Antifreeze: Product Development Issues

Houghton Chemical Company

Storrow Drive/52 Cambridge St.

Boston, Mass. 02115-6

Contact: Bruce Houghton (617-254-1010)

Waste Oil: Receiving/blending/recycling

Cyn Oil Corporation

1771 Washington St.

Stoughton, Mass. 02072

Contact: Bob Largesse (800-899-1038)

Oil Filters: Off-site Processing

Dow Smith

Cape Ann Industrial Park

Gloucester, Mass. 01930

Contact: David Dow (508-283-3287)

Franklin Recycling, Inc.

150 Herman Melville Blvd.

New Bedford, Mass.

Contact: Chuck Franklin (508-990-1006)

SECTION W

ATEAM NEWSLETTER

This section will be used to update the A.T.E.A.M. training manual through the use of a "Newsletter" distributed to all of the vocational schools. The "Newsletter" will include any revisions to the training manual as well as highlights of future pollution prevention technology.

SECTION X

CURRICULUM ON COMPUTER DISCS

This section contains two (2) 3.5" discs. Disc #1 is formatted for IBM compatible computers, and Disc #2 is formatted for MacIntosh Computers. These discs contain the essential text for this curriculum. Graphic images and handouts are not included in file.

SECTION Y

VHS VIDEO TAPE: "THE TUNED UP SHOP"

This half hour video provides an overview and introduction to the information covered in this *Curriculum Guide for Environmentally Responsible Automotive Servicing*. Produced for a broad audience, the video offers best management tips for a smooth-running, environmentally friendly auto repair operation.

The principles of pollution prevention through good housekeeping and recycling are incorporated in each action, whether it be an oil change, coolant flushing, parts cleaning or air-conditioning repair. Best management practices in autobody shops demonstrate how automotive refinishing operations can minimize paint waste and risks to employees' health. Regulations pertaining to hazardous waste, wastewater, and air quality are clearly stated.

The video was produced by Ellen Frye of The New England Interstate Water Pollution Control Commission in 1994 for the United States Environmental Protection Agency.

AUTOMOTIVE TECHNICIANS ENVIRONMENTAL ACTION MOVEMENT

A Curriculum for Environmentally Responsible Automotive Servicing

Produced by Massachusetts Bay Community College
for the Massachusetts Department of Environmental Protection

October 1994

Supporting Tools

Disk format: Text of this curriculum is available on 3 1/2" disk in MacIntosh or ASCII (IBM Compatible) format from the Department of Environmental Protection (617) 292-5898. Topical information sheets can also be obtained from DEP.

Video: Also available to complement the curriculum is a 30 minute video entitled "The Tuned-Up Shop," which can be purchased for \$25 from New England Environmental Training Center, 2 Fort Road, Portland, ME 04106 [Catalog listing #MM-A3] Call (207) 767-2539. The video can be borrowed from the Center for \$15. Each video comes with an 8-page companion booklet.

Slides: Slides which accompany the text are available from Industrial Color Labs, 51 Mellen St., Framingham 01701. Contact: Bruce Julian, Technical Sales (508) 872-3280.

Poster: The Pit Stops poster can be obtained from the Pollution Prevention Resource Center, EPA New England, Boston (617) 565-3387.

* * *

This curriculum is available for review and on a loan basis at the Massachusetts Vocational Curriculum Resource Center, 758 Marrett Road, Lexington. Telephone (617) 863-1863.

For further information, you may contact Nancy Wrenn, Compliance Assistance Coordinator of the Hazardous Waste Management Program at the Massachusetts Department of Environmental Protection (617-292-5587).

SECTION Z

ACKNOWLEDGEMENTS

PROJECT TEAM

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Jon Snow
Owner, Framingham Shell, Framingham, Mass.

